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HAND BOOK FOR HOSPITALS

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STATE CHARITIES AID ASSOCIATION

HAND-BOOK

FOR

HOSPITALS

NEW YORK
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1883

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Hand-Book for Hospitals.

I.

General Suggestions.

THE following pages were prepared in 1877 for the use of those members of the State Charities Aid Association whose duty it is to visit our public hospitals in New York County and other counties of the State. The rapid multiplication of hospitals of all sorts and the general increase of interest in such topics as the care of the sick and insane, institution management, hygiene, pauperism, taxation, and the distribution of public funds, have indicated the need of a second edition, which, carefully revised and enlarged, is now offered to the public, and especially to all persons concerned in hospital work, with the hope that it may prove helpful and suggestive.

Women visitors chiefly are addressed; for of many domestic details of an institution, such as details of cleanliness, order, and the tone of discipline maintained; of nursing, diet, and laundry work; of the employments and the general condition of the inmates, women make the best inspectors. In many European cities women are considered among the most efficient public almoners, being not only better able than are men to judge of the require-

ments of women and children, but discovering with greater facility female impostors, the most dangerous and troublesome class with which Poor-law authorities have to deal. In this country there is a growing necessity that women should interest themselves in the problems of pauperism, and that in visiting public hospitals and other charitable institutions they should know what they ought to observe, and what we all have a right, as citizens and taxpayers, to demand. Our leisure class is larger among women than among men, and women can better afford the time for the deliberate, careful, and constant inspection which our public charities need.

Managing boards.—Nor is this all. Our hospitals and asylums furnish a field for the exercise of the organizing skill and intelligence of women, not only as visitors, but as managers and officers. Few men can bring to bear on domestic details, whether of a hospital or private house, the quick natural perception and the trained faculties of an intelligent woman. Yet many of our hospitals present the curious spectacle of a responsible management exclusively in the hands of men, although a large part of their business is the care of women and children. It has come to be recognized that the specific duties of nursing are only properly performed when this branch of hospital service is under the direction of a committee of women; and the State Charities Aid Association has already urged, with gratifying success, that schools for training nurses should be multiplied wherever there are hos-

pitals. Such training-school committees, chiefly of women, should be an integral part of the governing board.

Good nursing, besides bedside care, includes well-cooked food, cleanly wards, and plenty of fresh linen, and for these the nursing service must rely on the aid and co-operation of the domestic department of the hospital. It is, therefore, only when this department is administered judiciously, and in accordance with the best sanitary principles, that the welfare of the patients and the interests of the public are fully served. All the domestic affairs, as well as the nursing, might very wisely be placed under the control of women, two or three of whom could be added to any existing board of commissioners or managers for this purpose, with the title of House Committee.

Where new institutions are forming, it is not difficult so to plan the government as to include women representatives; and women themselves should be no longer content with visits of sympathy and the distribution of luxuries in hospitals, pleasant and acceptable as these offices are, or willing to limit their charitable service to the raising of money in the spending of which they have no part. Women of fortune, who give or bequeath large sums for the building or endowment of charities, make a mistake when they fail to secure to their own sex a voice in the management of such funds. Our public charitable institutions show the need of better systems and more thorough supervision. Women may here well put to use on a wider scale,

for the public good, the quick moral instinct, the housewifely habits, and the power of domestic organization, the exercise of which is their acknowledged "sphere."

What makes a hospital healthy?—If any argument were needed to justify the course pursued by the State Charities Aid Association in making men and women co-workers in its committees, or to show that the administration of hospitals is within the province of housekeepers, as well as of business men, it would be found in the striking words quoted below:

"That which makes the healthiest house makes likewise the healthiest hospital; the same fastidious and universal cleanliness, the same never-ceasing vigilance against the thousand forms in which dirt may disguise itself in air, in soil and water, in walls and floors and ceilings, in dress and bedding and furniture, in pots and pans and pails, in sinks and drains and dust-bins; it is but the same principle of management, but with immeasurably greater vigilance and skill; for the establishment which has to be kept in such exquisite perfection of cleanliness is an establishment which never rests from fouling itself; nor are there any products of its foulness, not even the least odorous of such products, which ought not to be regarded as poisons. Above all, this applies to the fouling of *the air* within hospital wards by exhalations from the persons of the sick. In such exhalations are embodied the most terrible powers of disease, the spreading flames, as it were, of some infections and the explosive fuel of others;

and any air in which they are allowed to accumulate soon becomes a very atmosphere of death."[1]

We do not forget that the buildings our committees visit are often old and ill-ventilated, and in some instances full of radical errors of system and plan; but, at the same time, we desire to suggest the more excellent way. The making of improvements may be tedious and difficult, but they will never be made unless knowledge of right principles exists—principles that are of wider application than to hospitals merely, for they concern the arrangements of all asylums, poorhouses, almshouses for the aged and incurable, as well as for the sick. Where the hospital is simply an upper room in a poorhouse, it is even more important that correct principles in regard to system, ventilation, cleanliness, good order, nursing, and diet should be recognized by visitors, and when necessary pressed by them upon the attention of the authorities.

Ambitious architecture.—It is a reasonable assumption that the purpose of public hospitals is to cure the sick. Yet, trite as the truth sounds, this prime object is constantly overlooked, and the welfare of patients and the public is unconsciously sacrificed on the one hand to mistaken economy, or, on the other, to a rage for showy structures. Too often the ambition of an architect or a building committee is to "erect an edifice" that will be an "ornament to the town" and a "monument of benevolence"; but too often, also, the structure proves to be worth little else. The plan

[1] Mr. John Simon, Medical Officer of Health to the Privy Council of Great Britain.

may copy from other hospitals in other places all the old blunders, but it makes the "prettiest picture," and is chosen accordingly. Too often the choice of a site is determined by political scheming, or a public building is made unsuitably massive and ornate in order that money may be spent and somebody get a "good job"; while behind the ambitious front foul air breeds disease, and scanty, unclean, and unwholesome rations are served to the sick and infirm poor by untrained, insufficient, unhappily sometimes, vicious attendants.

Visitors must remember that while parsimony in building-space, in diet, service, and certain other departments of administration often amounts to inhumanity, merely elaborate architecture is no help to the inmates and no index of the sanitary condition of an institution. The "new building" may have its own radical errors, and be no substantial improvement on the shabby old one. Hospital reform can dispense with architectural effects, for it begins with simplicity, and, within proper limits, with cheapness of construction. But undue economy is blameworthy; a hospital may be too hastily and cheaply built. Good materials, correct drainage and plumbing, careful work, cost money. We urge that nothing be spent for show, but every thing for safety and thoroughness. We must not dogmatize out of our own inexperience on these subjects; we must not look to politicians and contractors, real-estate agents, or simply to architects; we must look to those who have made sanitary laws their special study for sound advice in regard to the construc-

tion of our public institutions and the choice of building sites.

The art of planning consists in securing the indispensable at all hazards, and as much more as may be possible; that is, in wisely selecting, from advantages within reach, those which will most surely and effectually promote the end in view. The first question to be asked is: What is to be done with the inmates within these walls? The second: For how many inmates is this building designed? and every part should be planned with the answer to these two inquiries distinctly in mind. Organize your building. Discriminate the departments. Place those departments nearest to each other whose purposes are most closely related. Separate the departments which are not related as widely as is consistent with a wise economy not only of money but of labor and time. Let each department form a whole. Let the division of the outer shell correspond to the division of functions. Do not compel the internal organization of the institution and the daily life of its inmates to conform to the mechanical ideas of the architect and builder; but compel the architect to shape and divide his entire structure so as most perfectly to correspond to the internal organization. Make the building *fit*, as a glove fits the hand.[1]

Know your own mind.—Let visiting committees be sure what it is they want to accomplish when alteration of an old building or the erection of a new one is proposed. They will find it much easier to

[1] F. H. Wines, Illinois: Conference of Charities, Saratoga, 1876.

secure public consent for an improvement if they know their own wishes and can state these with exactness. Let them form a clear idea of the size and character of the plot of ground required, and have a well-considered plan ready, with full details, if necessary, and a careful estimate of the probable expense. The plans and estimates can be shown and discussed, and will often carry the point when arguments from hygiene would not be listened to patiently. Public officers usually consider it a merit if they can save the county from expense. Suggestions for improvements are met by them with the answer: "It has always done well enough for us before; we guess we 'll let it do a little while longer," and other pretexts. Committees should be able to demonstrate that with simple and suitable building plans and an honest use of building funds, more patients may be housed and treated and more good done for the same outlay as with an opposite course. Thus no community need be deterred by lack of large appropriations from building a hospital where one is needed, or be tempted, by the recollection of the sum that had been sunk in it, into continuing to use an old and poisoned building. Taxpayers will generally appreciate the argument found in the fact that a hospital on the cottage plan, if its wards become poisoned, can be rebuilt every ten years for the interest on the sum usually found necessary to construct an old-fashioned massive hospital, of the same number of beds, leaving repairs to such a structure as the latter out of the question.[1]

[1] Dr. John M. Woodworth: Public Health Papers, vol. 2.

What makes a hospital unhealthy?—It is an established fact that massive, many-storied buildings after being occupied as general hospitals for years become soaked with infectious matter, and, under certain circumstances, are dangerous to patients. It is impossible to disinfect them permanently by any known means. The same is true of old frame-buildings long used as wards. Those who have studied the subject tell us that no building ought to be used as a hospital longer than ten or twelve years; but that after twenty years it should absolutely be considered as infected, and should be torn down. In the case of a substantial building, one expedient for securing safety would be the periodic removal of the entire inner surface of the walls, and fresh plastering. When a fever ward in the old New York Hospital was renovated in this way in 1864, out of five masons who were removing the plaster three died of fever in a few days. A little volume on "Hospitalism," by Professor John Eric Erichsen, of University College, London, gives facts and statistics showing the extent and permanence of wall-poison in old buildings. Erichsen says that "there is but one remedy possible for a pyæmia-stricken hospital—the pickaxe." The greatest care, therefore, should be taken to keep an old hospital as sound and as safe as possible, not only by watchful nursing in individual cases and periodic fumigation of the wards, but by thorough cleanliness everywhere, and by an exact, prompt keeping up of repairs in petty ways. A shabby run-down building, with leaky pipes and full of cracks and pockets

for the accumulation of dirt and slop, will more easily become poisoned.

Hospitalism, or hospital infection, means a general unsanitary condition of the building, or of its atmosphere, showing itself in the recurrence of cases of erysipelas, puerperal fever, pyæmia, gangrene, and the like. These diseases, a case of any one of which will poison the air of the ward for the time and tend to poison the ward permanently, are apt to result from such causes as the following: the long usage of a building; improper classification and aggregation of too great a variety of cases under one roof; dirty walls and ceilings and old floors; too many beds in a ward; beds unaired, uncleansed; carpets and stuffed furniture; insufficient bathing of patients and too infrequent changes of linen; imperfect washing of bed- and body-linen, bandages, and towels; choked air-flues; bad ventilation; bad drainage; wrong position of the water-closets; failure to isolate *nurses* as well as patients during and after infectious cases. All these causes are directly under the control of the lay authorities of a hospital and their agents. Other common sources of blood-poisoning among patients are a lack of thorough personal cleanliness and disinfection of hands, *nails*, hair, and clothing among doctors and attendants; carelessness in cleansing instruments; the indiscriminate use of sponges for surgical cases (tow and cotton wads, which can be destroyed after one using, are recommended as substitutes for sponges); dangerous nearness of the post-mortem rooms, and unchecked communication between

post-mortem rooms, or the out-door sick department, and the wards. The death-rate from such local causes, from bad construction and dirty ways, if honestly recorded, would be the right index of the sanitary condition of a hospital; the character of the cases admitted being always taken into proper account in tables of comparative mortality.

Ratios of illness.—But foul air and other septic influences not only create special diseases and thus kill outright a certain percentage; they lower the vital force of all the inmates of a hospital; they complicate the ailments and retard the cure of a large number of patients. The dead are not the only victims. Lyon Playfair has stated at a meeting of the British Social Science Association, computing for Glasgow, that for every death in that community thirty-four people were ill, each on an average eighteen and a half days; or, in other words, that for every death we must count six hundred and thirty days of illness. Until recently, the estimates for England were higher, making for each death, two persons constantly sick, or seven hundred and thirty days' disability; the count being based on cases of acute sickness or injury which incapacitates for the time from labor—chronic ailment or infirmity, such as paralysis or blindness, not included. In New York, taking working people alone, and tenement-house populations where sound health is an exception, the constant ratio of the sick to the well is often as high as one third.[1]

A large portion of this ratio of disability represents

[1] Dr. A. N. Bell: Ninth Report, New York State Board of Charities.

time spent by laboring people in the sick-wards of public institutions. When the bread-winner of a little family dies in a hospital in consequence of the evil atmosphere of the place, or other preventable cause, we lament the increase of the public burden. But the lingering illness of any laboring person in a hospital—or out of it for that matter—is also a public burden: it is a money loss directly and indirectly; it increases the taxes and lessens, for the time, the number of producers; every case of sickness in a community being equivalent, on an average, to a loss of fifty dollars. Account must also be taken of the lowering of the ability to labor of those who survive; and the transmission to children born afterward of weak and sickly constitutions. Wise economy, no less than humanity, requires us to adopt the best plans of construction, the best methods of management, for all our hospitals, poorhouses, and asylums, if we would avoid adding a complete institution-pathology to that of vice and misfortune. The right way in every respect is the cheapest way. Registration reports in Great Britain, conducted by Dr. Farr, show a steady decline in the death-rate; he estimates that from 1870 to 1880 about a quarter of a million persons were saved from death, and three million saved from a sick-bed, as a result of a better general knowledge and enforcement of sanitary laws, in that country.[1] Improved hospital management, isolation of communicable cases, systematic disinfection, employment of trained nursing, have all aided in this result.

[1] See the report of Massachusetts State Board of Health, 1883.

Pauperism and medical charity.—A hospital may be so arranged as to kill more than it cures; and so administered as to spread the spirit of pauperism among the well-to-do.[1] It is one indication of good management if a public institution is made, as far as possible, self-supporting; provided convalescents are not unduly detained in hospital for the sake of cheap labor, convalescing and being ill by turns, a common but false economy; and provided that "paying patients" are not multiplied to the exclusion of those destitute persons for whose relief public hospitals and insane asylums, supported by taxation, are established.

No hardship is imposed on the poor when they are trained to be provident; when for hospital or dispensary treatment those whom thorough inquiry has proved able to pay are required to pay a moderate sum, which otherwise would often be wasted in tawdry finery, or other forms of selfish indulgence. A carefully arranged system of medical relief is undoubtedly a check to pauperism. It helps many a poor family to tide over the time of distress which sickness or accident brings. But indiscriminate medical charity may do as much harm as indiscriminate alms-giving of any other sort; and dispensary and hospital practice in New York City at least, shows a lamentable increase of late years in the number of patients of a better class who are not ashamed to accept the unpaid services and resources which should be reserved for the really poor. The multiplication of dispensaries for special practice and

[1] Professor Huxley: address at Baltimore.

clinical instruction adds to this difficulty. Hospital managers also often show a mistaken pride in magnifying the supposed amount of good that has been done, by their annual statements of the large number of free patients admitted. Where patients themselves, or their relatives and friends are encouraged to pay even a little toward hospital care, self-respect and family interest are more likely to be preserved.

If we do not adopt the broad assertion of some political economists that hospitals foster pauperism, we must admit that our ample charities, both public and private, and their lax administration have done something to encourage improvidence, and to weaken a sense of family obligation. The question is pertinent whether social welfare is not likely to be best promoted by reducing our system of poorhouses and hospitals with their attendant evils to a minimum; by individualizing charity, and making the family—the home—the centre or unit of our efforts, through some well-organized plan which shall combine volunteer investigation into the cases of individual applicants, and personal knowledge of their wants, with official or professional relief. The formation of the Council for the Organization of Charity in New York City comes none too soon, and is a step in the right direction. Other cities have preceded us in this work.

The family tie among the poor needs all the help we can give it; any thing that weakens it does harm to all. When the head of a household is in hospital, the little family is often scattered, and estrangement

begins. John Burns, with a broken leg, surrounded by comforts at an up-town hospital, fretted to "get home," and after many evasions of the reason, at last it came out: "They 're very good to me here; beefsteak and oysters, and ladies a-standing at the foot of the bed and asking me to try and think of something more that I want; but if I was there I could mind the childer as I lay in bed, and *she* could go out to work and get bread for us all." Or take a wife's story from the same hospital. The usual preliminary questions were asked: "Are you a married woman?" "No, ma'am; not exactly." "Do you mean that you have lost your husband? You are a widow?" "No, ma'am. I took sick and went to a hospital and he left me." These are types of many cases. If these could have been equally well nursed at home, the children would not have gone hungry; the wife and the husband need not have parted.

Preventive measures are always wisest. Let the poor be taught and helped to avoid the causes of disease; let there be strict sanitary legislation, and the honest enforcement of laws in regard to tenements, school-rooms, factories, and markets; then, if we could have a good provident dispensary system, like the English system, supplemented by missionary nurses and diet kitchens, hospitals might become a much less costly item in our appropriation bills."[1]

But hospitals, to a certain extent, will always be

[1] Dr. W. Gill Wylie: "Relations of Hospitals to Pauperism." *Popular Science Monthly*, October, 1876.

needed, and the main question recurs: How shall we cure the patients in the quickest and cheapest way; how shall we reduce the dangers which inevitably spring from collections of sick and wounded people under one roof? *Disperse the patients*, we answer, as widely as may be consistent with economy and convenience of professional care and nursing; classifying them strictly as to disease, age, sex, and condition, *i. e.*, their liability to imbibe infection, or to cause infection in others. To accomplish this dispersion and classification, how should a hospital be built?

II.

The Hospital Building.

Popular interest in hospital reform in this country dates from 1861. Early in our Civil War the task of preparing a model plan for a government hospital in Washington was assigned to a committee of the United States Sanitary Commission: Dr. Wolcott Gibbs, Dr. C. R. Agnew, and the late Dr. Wm. H. Van Buren. The plan prepared, with some modifications made by military authority, was followed. About the same time a distinguished French officer, addressing the French Academy on his former experience as sanitary inspector of the army in the Crimea, said:

"**An ideal hospital** would be a small hospital, with small, detached wards, well ventilated, and with beds far apart, remote from centres of population, and surrounded by open walks and grounds. Hospitals that are situated in the outskirts of towns—in the open field, so to say—have always seemed to me more healthy, and have produced more cures than institutions smothered in populous quarters or simply surrounded by an ordinary city atmosphere. Though the air-supply be as generous as possible, and the ventilating apparatus complete, in reality the air of the wards, even at its best, will be just what the air of the street happens to be, no better.

Abundant air-supply will not suffice if the air itself is deprived of its life-giving qualities, or is intermixed with poisonous matters. Air is vitiated when it is scorched by contact with overheated iron surfaces either in the ward or before entering it; when it is borrowed from close corridors, from staircases, and lobbies on which water-closets open; or when it is drawn from dirty streets in a packed neighborhood, where perhaps other hospitals, or cemeteries, factories, tenement-houses, and many mephitic centres spread abroad their harmful emanations." [1]

The latest authorities, eminent physicians and hygienists, and writers on hospital construction, only repeat the same truths, and point as models to the ridge-ventilated, detached wards of our military and marine hospitals.

The approved plan requires one-story wards, raised on piers or arches, that the air may circulate freely; the ground beneath being coated with asphalt or other smooth, dry surface; the wards are to be built of wood where the fire laws permit, or of brick, with a "damp course" of slate or asphaltum; they must be torn down if, after a few years, they prove infected. There is to be nothing within the four walls except the patients, their beds, tables, and chairs; the water-closets and service-rooms, the drainage-pipes, and whatever is necessary to make each such ward almost an independent hospital, being built outside it, in what can be a permanent and even two-story annex. The wards, which may

[1] Michel Levy, Consulting Member of the Board of Health of France, 1862: La Salubrité des Hôpitaux.

be grouped in various ways, must stand apart by a space three times their height, that one may not cast a shadow on the next. The roofs are preferably ridge-ventilated, and the ceilings finished on the rafters, not plastered. Connecting corridors, when climate requires them, are either entirely open or are well aired by side sashes, and never lead directly to the ward, but into the annex or service-building. The administrative offices and kitchen for a group of wards occupy a central position.

Detached wards have been used in Europe for several years with good results; as at Kiel, Berlin, Leipzig, Heidelberg, Glasgow, Manchester, and at Rotherham, England, where there is a children's hospital of one hundred and fifty beds, all in one-story pavilions. "On the continent, the majority of those who have given much attention to the subject prefer wards of one-story, and isolation and separation of the various buildings."[1]

In America attempts in this direction have been made at the Roosevelt Hospital, New York; and at the Presbyterian Hospital, Philadelphia. There are two very good one-story detached pavilion wards, for twenty-eight beds each, on the grounds of the City Hospital, Boston. The frames of these two wards are sheathed with boards, covered outside with corrugated iron; the roofs are slate. They were cheaply constructed under the theory that after a few years' use they ought to be destroyed and replaced by others of similar character. They have now been in use seven years and their sanitary con-

[1] Dr. J. S. Billings, U. S. A.

dition has been excellent.[1] The Massachusetts General Hospital has four one-story wards, two of them of the same temporary character, which have all proved satisfactory. The U. S. Marine Hospital service has adopted improved one-story plans for its new hospitals, which also furnish good models.

The bed is the unit.—Hospital visitors, throughout the State, ought always to throw the weight of their advice in favor of the most enlightened practice. The custom of piling sick people in layers three or four stories deep should be abandoned, and simpler buildings, detached, on wider spaces of land, substituted for the present dangerous agglomerations of cases. The bed is the unit of hospital administration; in addition to medical care, the precautions which surround it, the quality of the nursing, and the air-supply are the measure of the hospital's success. Having established for this unit the best sanitary conditions possible, we may proceed to group a few beds and make a ward, and, finally, to group detached wards and make a hospital. The cottage, or one-story pavilion plan, wherever it is possible to adopt it, not only for hospitals, but for our convalescent homes, orphanages, asylums, and infirmaries would break up the mechanical routine of our public institutions, which is inevitable where there is a large household with a limited number of attendants, and would give them something of the cheerfulness and naturalness of ordinary life. The true principle in providing for dependent and defective persons is to classify them as closely as pos-

[1] Dr. G. H. Rowe, resident physician.

sible, and to make each class in any one building small.

The points in the argument for one-story wards may be summed up thus:

1. Experience and science agree in showing that widely-detached, one-story wards allow the most thorough ventilation, and therefore the smallest chance for the accumulation of infectious particles. A gale of wind may prove a better disinfectant than a barrel of carbolic acid.

2. They neutralize the evils of massing large numbers of cases, or varieties of cases, under one roof. They make classification of cases easy and natural. In the chance of a case of contagious disease showing itself, the ward only and not the whole hospital is endangered.

3. One-story wards require less vigilance; dust and foul air find fewer lurking-holes and channels; cleanliness and ease of supervision are more readily secured. Two-story hospitals may be kept healthy for a few years with extreme care and intelligence. Hospitals of more than two stories ought never to be contemplated.

4. A ward hopelessly poisoned by long occupation can, if detached, be torn down and another one built without disturbing the general order; and when additional accommodation is necessary, other wards can be added one by one.

5. An advantage of one-story wards which visitors will recognize is the ease with which patients can be taken, bed and all, out of doors in fine weather. Even the very feeble can be rolled out

on the grass by an incline, if the height of the under-pinning allows, or be wrapped in a blanket and carried out, with no fatigue of "getting ready." If fire occurs, the peril may be limited to one ward, while rescue of the patients is obviously easier.

Question of cost.—As to the expense of building a large hospital in detached cottages, it is possible that heating arrangements and service might be dearer; the cost of construction would be less than on the big-house plan, for massive walls, foundations and staircases would be unnecessary; greater ground-space would be needed, the more the better; the allusion here is to out-of-town hospitals, where land in larger tracts may be had at cheaper rates. But hospital construction is not a question wholly of saving money; it is a question of saving life. "We are persuaded that the liabilities incurred by increasing the population to surface area are so manifold as to render it very unwise to construct two or more stories of wards for a permanent hospital. Nor do we believe that pavilions of more than one story are more economical in construction and management. The only plausible reason urged in favor of multiple stories of wards is the want of adequate ground-space, as in the location of hospitals in the built-up portions of cities. But it is questionable whether even that excuse will much longer avail; all modern scientific inquiries into the conditions under which the sick recover tend to prove that hospital sites should be selected where there is ample area, and hence in suburban rather than in urban districts." [1]

[1] Dr. Stephen Smith.

In cold climates the comfort of detached wards is made possible by double walls. The air-space between should be ample and judiciously ventilated; there may be a ventilated attic, instead of direct openings at the ridge; and the brick arches under the ward may be sashed with glass in winter, and the ward windows double-sashed. Then, with adequate heating apparatus there need be no difficulty about winter temperature.

The site.—In order to determine how nearly the ideal is reached, the first most important point to consider in visiting our public hospitals is their site. This is the point at which sins in hospital-building are generally first and irredeemably committed. The site should be as open as possible, so as to secure the breeze from every quarter, and somewhat elevated, so that all dampness can be drained off. Stagnant water or ponds or streams near by, used as receptacles of sewage, will make the finest building untenantable. Do not fail to examine the neighborhood with both eyes and nose, and to study the slope of the land and the character of the soil. Remember that if the recovery of the sick is the object of hospitals, these should never be built among dense populations or on bad soil; if medical schools are the avowed and sometimes legitimate object of hospitals, twice the number of cases can be brought under the notice of students in a given time, and thus medical education be better promoted in hospitals where a healthy, open site favors rapid recovery and discharge. Means of swift transportation are so much improved that, except for

accident cases, absolutely no hospital provision need be made within the limits of towns. Our American towns, it is true, grow so fast that they sometimes spread and surround a hospital which may once have been in the outskirts.

Wherever a new hospital is projected, let visitors use their influence in persuading the town authorities, or the benevolent persons who undertake the work, to put a smaller share of their fund into "monumental structures" and a larger share into land, thus securing the first necessity, an ample building site. If there is not money enough to build as large a hospital as the needs of the town require, let visitors recommend that enough land be provided at the outset, all the same, and held in reserve, and that part of the supposed need of hospital accommodation be first supplied by one or two cottage wards on open ground.

Wherever there is an old hospital, cramped and crowded, and money can be had for improvements, let visitors urge that the first improvement consist not in building a "new wing," but in buying adjoining lots, if possible, so as to widen the air-space about the old buildings. For every fifty patients in a hospital there should be about one acre of site, so as to allow proper dispersion of wards.

Size of hospital.—Before beginning to build a hospital, the proportion of sick poor likely to apply for admission should be carefully estimated, and the number of beds, that is, the size of the hospital, determined. Experience shows that one bed to every thousand inhabitants in a large town is a fair

proportion. There are instances of towns where benevolent efforts of this sort have outrun the demand, and hospitals, fully equipped, remain with merely a handful of patients, the running expenses being almost as large as if the beds were all full. For fifty patients there should be accommodation for sixty beds, so that there may always be a few beds in reserve, and that wards may be emptied and cleansed in rotation.

Care of grounds.—Foliage serves to filter the air of dust and absorb noxious gases. Trees and shrubs, therefore, are desirable near a hospital; but they should never be allowed to shade either the buildings or the grounds too densely. Decaying vegetation and dampness are objectionable; great care should be taken to keep gardens and ornamental grounds in order; and instead of deciduous trees the growth of trees and plants which tend to neutralize malarious influences—especially those containing resinous balsams, such as pines, spruces, and hemlocks—should be encouraged.

Building material.—Wood is the best building material for country hospitals, with under-pinning of adequate strength and height. Poor brick, cheaply laid, makes a poor, shabby building; and experience has shown that brick asylums are no more fire-proof than wooden ones. Frame wards, well built and kept well painted, will prove strong, warm, and durable.

Points of compass.—A hospital should never be built round a closed court. Whether it have one or more stories the long axis of all its wards

should run as nearly as possible from *northeast to southwest*, so that the sun can dry the walls, and cheer the place by shining in at the windows, on one broad side or the other, the whole day; the part of the ward presented to the north, or shadow side, being the narrow end. The ends of the wards should *never* terminate in lobbies, or be obstructed by service-rooms, water-closets, or staircases, but should open by windows or wide glass doors, with transom sashes above them, to the free air. Currents of air take the direction of the longest axis; the end-to-end ventilation is worth more than the cross-current, because a larger body of air is moved with the same amount of impetus; it sweeps a ward clean in a few minutes, through and through, and exposes the patients who are in bed less to draughts. The annex containing the water-closets and other service-rooms should be built at the north end of the ward, but a little at one side, so as not to interrupt the air-currents.

Vital conditions.—Even the smallest hospital may be planned in a way to secure many of the advantages of detached buildings; the wards being separated by a ventilated corridor from the portion of the building reserved exclusively for administrative purposes, officers' room, kitchen and store-room. The laundry and the dead-house must of course be constructed outside. Mixing up together indiscriminately sick-wards and household rooms and offices is one of the most common mistakes; it increases the risks for both patients and officers, and forms one of the usual causes of low-fever cases among the latter.

Simplicity is an essential of good hospital construction. Abundant light and ventilation through every part and on every side of a sick-ward can only be secured by separating the departments so far as possible. Complication of plan betrays ignorance of hospital requirements. Every hole and corner, every passage, every needless small room interferes with light, ventilation, cleanliness, discipline, and facility of supervision—the vital conditions of a good hospital. "Every skulking-place which can be spared must be avoided. Every five minutes spent upon cleaning what had better not have been there to be cleaned, is something taken from and lost by the sick. As an invariable hospital rule, publicity may be considered the best police and the best protection against filth and disorder." [1]

Whatever the general plan of building may be, it is a serious error to build wards opening directly into one another, as at Bellevue and elsewhere, thus making a common atmosphere and doubling risks. In old buildings of this construction, let visitors inquire if it is not possible to close up the connection between rooms, and even to floor over staircases, removing the staircases and water-closets, and rebuilding them in spacious towers, outside the hospital, thus isolating one floor from another.

Square wards, with beds all round, are generally undesirable. With square wards, some beds must be in corners, on sides away from windows, and the closets and baths are brought too near to the ward. A nurse needs to take in her ward at a glance, running

[1] Florence Nightingale: Notes on Hospitals.

her eye along the two rows of beds, as an officer does along the company line, and seeing at once the urgent necessity of any patient. But for the patients themselves, sometimes, square wards, like the Warren Ward in Boston, have a pleasant aspect, and the "corner bed" gives a coveted chance for privacy now and then. In a square ward, also, the stove or fireplace and the air-shafts may be put in the centre of the ward and thus more nearly equidistant from all the beds; whereas in a long ward two fireplaces and two shafts are needed. Square wards, where these are preferred, should be small wards for a small number of beds, for the square should never be more than thirty feet. If that size is exceeded, the sunlight will not so completely reach all parts of the ward; and the surface of the ground beneath will be too far removed from the purifying effects of air and light.

The size of a ward, and the number of beds which may properly be put in any given space, are fixed by sanitary necessity; but there is hardly a point in the arrangements of hospitals or of asylums for any purpose, as visitors will note, so much neglected as this. Large wards save extra nurses; one head nurse can overlook two or three assistant nurses and from twenty to thirty patients if they are not too much scattered. Small wards with from two to half a dozen beds are objectionable in working a large hospital. They increase labor, and are difficult of supervision. The smaller the ward the larger should be the proportion of cubic space allowed to each bed in it; for small wards, where

there are two sizes in use, are apt to be reserved for the worst cases. Besides, a certain amount of space is needed for diffusion of air; a large room is ventilated more easily than a small one, but, it has been said, you cannot ventilate a *crowd*, even in the open air.

Cubic space.—As a rule, each bed in a medical ward should have at least eight feet of wall space; each bed in a surgical ward, ten feet of wall space. Room enough should be left between the head of the bed and the wall to allow a nurse to pass; and the aisle down the middle of the ward should be from ten to twelve feet wide. The width of the entire ward should be from twenty-eight to thirty feet, and the length may be twice, or three times, or four times the width, but never more than that. Fourteen feet is a good height for the ward walls. A raftered ceiling and openings at the ridge, or on the car-roof plan, will increase the air-space and improve the ventilation. In a hospital of say fifty or sixty beds, sixteen beds in a ward is a good basis of calculation for medical cases, the ward proportions in that case being sixty-four by thirty by fifteen feet, if the ceiling were flat. This gives an average of one hundred and twenty square feet of floor-area to each bed, and eighteen hundred cubic feet of air-space.

Proportions for surgical wards need to be much ampler. They can be made ampler by lessening the number of beds. Remove every alternate bed in a ward of the size described, and you have three thousand six hundred cubic feet of air-space for each

surgical case. The Warren and Jackson cottage wards of the Massachusetts General Hospital give, the one eighteen hundred and forty, the other three thousand cubic feet of space per bed. The larger figure is much the safer rule with severe surgical cases.[1] As one or more nurses must always be on duty night and day, they must be considered in calculating the allowance of air. It is assumed that all the beds will not be full at the same time. The proper width and height of a ward are nearly fixed figures. The length may more properly vary. When a hospital grows and more room becomes necessary, short detached wards, where the ends are left free, may be lengthened a little without any change in their width.

Crowding is a relative term. A number of bad cases in a ward may over-fill it in a sanitary sense, although half the beds are empty, because the air will be more rapidly fouled. The over-crowding of well people, if long continued, we know will produce some variety of fever, while the over-crowding of wounded people, either accident cases, or cases of operation, or of suppurative disease, will be sure to develop hospital poison in some form or other. It is the *nature* of the cases, and not the number only, which causes contamination of the air and creates danger.

A little knowledge of the character of the cases admitted to a hospital, and of the significance of their symptoms—knowledge which may be possessed by any intelligent person, superintendent,

[1] Esmarch.

visitor, or head nurse, without the least trespass on professional ground—would help the judicious distribution of patients in certain wards. It is not enough understood, for instance, how sensitive to septic poison are cases of burns, nor what a source of danger they become to others when the suppurating surface is extensive, making isolation for them imperative. Lung diseases, sometimes, make as bad an atmosphere as surgical cases.

If no regard is paid to the character of cases crowded into a ward, or if five people are to sleep in three beds, as has happened at times in public hospitals in New York City and vicinity, it hardly matters what the "regulation" cubic space may be. Wards which to the inexperienced visitor seem fresh and pleasant by day, with the windows open and a summer breeze blowing, if inspected in winter and by night, or worse still, at five o'clock in the morning, might be found very foul.

Professor Erichsen's rules.—From experience in his own hospital, Erichsen gives seven as the number of patients with open wounds who can be put in one of his wards of fourteen-bed size with moderate safety. Among the simple rules which he lays down a few may be selected. They all concern points which properly come under the observation of a visitor, or a head nurse, and if enforced, would go a long way toward keeping the wards healthy.

"1. The isolation of patients suffering from old or fœtid ulcerations, more especially those of a cancerous character.

"2. The separation of patients with suppurating wounds from one another by putting in the next bed unwounded patients.

"3. Care not to allow more than one half of the patients in any given ward to have suppurating wounds, even if these wounds be trivial; nor more, if possible, than one third if severe.

"4. Instantly to isolate all cases of septic disease.

"5. To compel the nurses to wear dresses that can easily be, and that frequently are, washed.

"6. The frequent purification of the bedding, the blankets more especially, which are often very imperfectly cleaned and purified, and, like all woollen fabrics, harbor infection long and tenaciously.

"7. To close every surgical ward once a year, for a month, during which time it should be disinfected and whitewashed.

"8. And above all, and under all circumstances, to avoid over-crowding, for however short a time."[1]

The ward windows should take up one third of the wall space; this is one of the fixed laws of hospital construction. The windows should be on opposite sides, at least one window between every two beds in medical wards, and one window for each bed in surgical wards. We can warm a room artificially, but it is beyond our power to create an equivalent for sunshine and the vital influences, physical and moral, which it brings into a sick-room. Even in warm climates, in midsummer, it would be better to have windows enough and large

[1] Lectures on Hospitalism; University College, London.

enough, and to shield the ward from glare by outside blinds or canvas awnings. Inside slatted blinds are objectionable; they are capital things for collecting dirt. Where they are not properly cared for, a thick paste of dust and organic filth can be scraped from the slats at any time. Hospital windows are much better without them. The window-sills should be within two feet of the floor, and the sashes not less than three feet wide, and reaching to within one foot of the ceiling. A transom or panel, ten inches deep, and as wide as the window-frame, should be hung in the wall over each window, hinged at the bottom, so that it would open at the top. Or the window should run up close to the ceiling, and its upper sash should be hinged for opening inward by cord and pulley, or some proper mechanism; otherwise all the upper part of the room will be a reservoir of overheated and bad air.

An excellent plan, and one which visitors can recommend as easy of adoption in old buildings, is to make the window-sashes in three cross-sections or flaps (instead of the ordinary two sashes), hinged, one or all, at their lower edge, opening inward at any desired angle, and closed by cord and pulley or some mechanical ratchet and crank. This plan is already in satisfactory use. The window-frame in this case is the better for being deep, as it prevents side draughts; or a triangular piece of plank may be nailed to the upper part of the window-frame, projecting in a way to close the side opening when the upper sash is let down. Other forms of window ventilators are mentioned in the chapter on Air-Supply.

In exposed places where the sashes are double, the lower part of the outside sash may be made to hang on hinges and open outward by a metal rod or arm, while the upper panes of the inside sash, also hinged, let down inward. A steady current of air, slightly warmed by passing between the glasses, is thus secured, and the glass can be reached and kept clean. If double sashes slide up and down in the ordinary way they are troublesome to manage, and you get an additional and perhaps undesired cold draught from the opening across the middle. Large sashes hung with weights are heavy for a woman nurse to push; ropes knot, rot, and break; windows are left shut in cold weather, and ventilation comes to an end. With hinged panes and cords passed through a screw eye, and hanging within easy reach, there is no excuse for negligence. Large panes are better than small ones, because there are fewer joinings and ledges; and good thick glass is warmer and in the end more satisfactory than a poor quality of glass.

Lifts and staircases, required in two- or more-storied hospitals, add greatly to the expense of construction, and have many disadvantages. Where there are staircases visitors must note whether they are fire-proof, and fitted with strong handrails, and wide enough to allow a stretcher to pass up and make the turns on each platform.

Extra staircases in a large building are necessary as means of escape in case of fire, but in ordinary use they are bad for discipline. It would be better in a small hospital to have one common entrance

and only one main staircase, and to compel all the coming and going to be done by one channel under constant observation. Pharmacies or other offices into which attendants or patients are allowed to go and shut the door are subversive of discipline. There should be a window or hinged panel in the pharmacy or office door, and every one should be required to wait outside for the answer to the errand.

Piazzas.—In two-story hospitals where the wards for men are below and for women above, an upper piazza or out-door gallery should be provided for the women. It should open directly from the wards in such a way as not to intercept light and air, and if used as a sunning place for patients would be an excellent thing. The floor should be on a level with the ward floor, so that convalescents, able to roll themselves about in chairs, may go in and out as they choose. The men also need their own sunning place. Window balconies are not enough; men patients especially need space to move up and down in, and a place where they can smoke should be set apart for them; it goes a long way toward keeping them good-humored and making them well. Pitching a roomy tent for them on the grass, where there is space enough for it, is a good plan in summer.

Panic from an alarm of fire is a distressing risk which must be constantly faced in buildings of multiple stories. All public hospitals and poorhouses should be provided with fire-escapes; and the duty is imperative of providing and keeping in ready condition, fire extinguishers, water-buckets, a suffi-

cient length of hose conveniently reeled, force-pump, axes, ladders, or whatever may be necessary in the emergency of fire. Hospital employees should be drilled at stated times in the use of such apparatus.

Day-rooms.—A pleasant sitting-room, exposed to the sun, where convalescent patients may sit during the day to read or sew, aids their recovery. They are thus removed from those who are still confined to their beds in the wards, and a long day is made less tiresome. A separate dining-room also is required, and is spoken of elsewhere. Visitors ought to urge all the points mentioned above wherever necessary; they must beg also that in old hospitals, or in the absence of isolating huts, a separate room here and there be kept in reserve for temporary use for special cases.

Tents for summer.—The plea should be made at every old hospital for one detached ward, at least, for the surgical cases. Or, following what has been the custom at Charity Hospital, Berlin, and the Cantonal Hospital, Geneva, the detached ward (which in that case might be a large wall tent, or might be built without heating apparatus other than a small stove) could be reserved for all the patients of one sex in summer, so as to give opportunity for emptying and airing for a month at a time the winter-used wards of the main building. During the five months of warm weather the expedient of tents for open-air treatment of the worst surgical cases has been successfully tried at the City Hospital, Boston. Two large tents are used for twenty patients each, and five smaller tents for special cases. In addition,

there are small tents for commissary purposes, with water and drainage convenient, and the arrangement has proved highly satisfactory, and of great value in the recovery of serious cases.[1]

Isolating huts.—One or two little cottages or huts, for the purpose of isolating cases of infectious disease, should be built on the grounds of every hospital; these huts to be burned up every two or three years. In the appendix will be found a description of an isolating cottage for three beds, two patients, and a nurse. The plan was furnished by a member of the State Charities Aid Association, and the cottage was built on the grounds of the Presbyterian Hospital, New York. It is a good model for such isolating huts elsewhere. Similar cottages have been built at the Woman's Hospital. In a general hospital there should be two such huts, to prevent the scandal of the mixing of the sexes, which, gross as it seems, has, within the writer's knowledge, been authorized by hospital officers either ignorant or indifferent concerning the requirements of decency.

New hospitals often receive a large proportion of chronic surgical cases—that is, tedious and offensive cases, requiring isolation. It is the part of wisdom to anticipate this need, and to make provision for such cases by building detached huts. Where there are enough wards to leave one or more at all times unoccupied, and completely exposed to the air and sun, the great danger of gradual contamination of wards is lessened. The rule given by experts is

[1] Dr. G. H. M. Rowe, Resident Physician and Superintendent.

that one twelfth of all the beds in a hospital should be always empty. Much may be done to obviate the evils attendant on multiple-storied, obsolete old buildings, by rigorous cleansing of the wards, by conscientious, intelligent care of individual cases, and by antiseptic treatment where that method is pursued. But even with the best management, the majority of such hospitals cannot be made to give equally good results with those attained in a properly built hospital. Visitors must carefully note the maxims of construction and classification adopted by the Association, and enforced in these pages. They will be found summed up in the Association's fourth annual report, for 1876.

III.

Air-Supply and Heating.

The air-space required for each bed has been stated, viz., from eighteen hundred to three thousand or more cubic feet; but what should be the air-supply? It is not meant that a patient shall have his three thousand feet and no more; for this quantity must be constantly changed, at least as often as once every hour, for the same bulk of entirely unbreathed air from out-of-doors.

Clean air.—Every one connected with hospitals or asylums, visitors and nurses, should bear in mind —and it cannot be too often repeated—that we poison the air by our own exhalations, and that with sick people every thing depends on getting them as much as possible out of their own atmosphere. But many people are afraid of clean air, and have to be urged to take it as if it were medicine. One would think from the objection many people, especially the poor and ignorant, have to fresh air, that it is a poison instead of a life preserver. Never fear fresh air; it will be one of your most faithful allies in the treatment of disease. Provided a patient were kept warm enough, his chances of recovery would be much greater if he were hung outside of the ward windows, instead of being shut up within the ward walls.[1]

[1] Dr Barnes: Notes on Surgical Nursing, London.

Professor Esmarch says :—"The maxim must hold good for hospitals, that it is better for our surgical cases to have air a little too cold than foul air."

The change of air in a ward is rendered practicable by difference of in-door and out-door temperature; or by mechanical currents. The rapidity of the change depends on the size and number of openings, —of windows and doors,—and on the character of the wall-surface ; and is increased by increased difference of temperature. The air-supply, however it is provided, should not be subject to the fancy of patients, or even nurses unless they are trained ones. There should be fixed rules as to opening windows and ventilators, and employees should be required to obey them implicity. To test the air of a ward the visitor should enter it directly after being in the open air fifteen minutes, and then notice whether there is any close smell.

Night air.—If we breathe at all after dark we must breathe "night air," therefore the ventilation of the wards through the night should be carefully considered ; for while air not vitalized by sunshine is less desirable, it must not be wholly shut out. In severely malarious regions evening air or early morning air should be cautiously admitted. It is a mistaken practice to let a ward get very close and foul (either by night or day) and then trust to spasmodic flushing with volumes of fresh air. The better way by night is to provide for a small, steady current of air, constantly flowing through the ward, and keeping the atmosphere fresh. The wards of a hospital, unlike the rooms of an ordinary house, are oc-

cupied continuously, day and night. To the usual excretions from breath and skin are added special impurities. Suppurating wounds throw into the air pus-cells in a state of decay; the urine and fœcal discharges, poultices, and the contents of sputa cups, add to this dangerous mixture. The result is a "foul stirabout" of exceedingly minute solid particles, which, unless special and constant pains be taken to get rid of it, fastens itself upon wood-work, plaster, bedding, clothing, and every thing which is in the least absorbent. In course of time, walls, ceilings, floors, and furniture receive dangerous deposits of infected dust. This is the explosive fuel which Mr. Simon warns us of. It is not strange that special diseases haunt the wards of old hospitals. The ventilation should be such as to leave no corner of a ward unsearched by a current. To build and manage a hospital in such a way as to secure enough pure air, winter and summer, is indispensable, if we are to maintain the right standard of hospital hygiene. Notice that the phrase used is *pure air;* ventilation *plus* cleanliness.

How much is enough?—The air-currents of the Warren Ward, in Boston, were measured on several occasions, in winter when fires were lighted, by the late Dr. George Derby. The supply of air was found to be enormous and, what is important, there was no perceptible draught. On one trial air was found entering at the rate of five feet a second. There were four ducts which together gave 144,000 cubic feet of air an hour. With twenty patients in the ward this was an allowance of seven thousand

cubic feet an hour for each, to be shared with the nurses, and with the doctors during their visiting time. Dr. Derby said : " This is a great supply but *there cannot be too much.* On the whole it is the best ventilated hospital ward I ever saw."[1] This was winter ventilation, and the method will be described when we come to speak of heating.

Air-shafts.—Visitors do not always have the means of accurately measuring the quantity of air which enters a ward by the registers or air-shafts; a mathematical formula would be necessary, and an anemometer to determine the exact velocity of the wind. The best that visitors can usually do is to see that abundant and proper means of ventilation are provided, and that these means are *really used.* The sectional area of ventilating openings, where shafts are used, should average seventy-two square inches for each patient in a ward, doors and windows not counted. This includes inlets and outlets. Multiplying seventy-two square inches by the number of patients, a visitor can judge whether there are air-flues enough and of sufficient size.[2] With an opening of say a foot square, and air coming in at five feet a second, and steadily kept at that rate, we should get in an hour eighteen thousand cubic feet of air. This is a fair supply for six persons; but is less than half the quantity per patient which passed through the larger ducts of the Warren Ward, and which Dr. Derby did not find too much. The draft at the point of entrance, with five feet velocity,

[1] Annual Report of Mass. General Hospital, 1874.

[2] Parkes' Manual of Practical Hygiene gives tables of effective sizes of air-flues.

would be about the same air-motion which is felt against the face in walking at the rate of three miles an hour in a still atmosphere. By the time the air has diffused itself in the room this velocity would probably not exceed, and ought not much to exceed, two feet a second, if it is cold air.

Two or three large air-flues will be more effective than several small flues having an equal aggregate sectional area. With a view to reduce friction the inner surfaces should be smooth-finished, tight at the joints, and there should be few or no bends and angles—round flues being the best. The inlet and extraction flues are best kept equal in size. Care must be taken not to have foul air-flues too large, otherwise the current will play about in them or there will be down draughts. As a rule, air-flues should be short, and so built as to be easily got at and cleaned out. If there is any way of heating outlet tubes, they may be put anywhere in a ward. If there is no means of heating them, they must be near the ceiling, and fresh air admitted below on a different level. It is generally best not to put extraction flues in the outer walls; the cold chills the air, and foul flues are not apt to draw unless they are warm. All air-flues, like chimneys, must *draw*, or they are worthless. Recent experiments made at Kew Gardens, by Douglas Galton, William Eassie, and others, show that an efficient means of securing a constant *increased* movement of air through a pipe or chimney is to increase its diameter toward the top. Where a shaft is designed to take foul air from two or more rooms, one above another, the shaft

must gradually widen in size at each story, in proportion to the additional amount of air to be withdrawn from that story.

But in two-story hospitals, each ward should have its separate air-shafts or flues, with only the registers or openings required for that ward. The danger of interchange of air between hospital wards is very great and can only be avoided by giving each story its own flues. Water-closets and sink-rooms should vent into special flues of their own. With superimposed stories, in order to ensure a constant upward current, all extraction flues require to be artificially heated. This can be done by some adjoining chimney or stove-pipe, or by a vertical line of steam-pipe, or by a fire kept burning in summer as well as in winter at the lowest point, if it is a brick shaft. Even a gas flame or a lighted lamp inside a metal flue is a great help to suction. The light left burning on the hearth in sick-rooms at night serves a good purpose as an aid to ventilation, creating a small but steady current up the chimney.

Lights.—If gas is burned it should be utilized in practicable places to warm an outlet tube, a sliding pane of glass or mica being inserted in front of the burner. Churches and public halls are often arranged in this way. Every gas-pipe could have an outer casing, passing out at the ceiling or roof, to carry off the products of combustion and serve in its measure as a foul-air vent. The hanging lamps in the neat houses of some Shaker communities are fitted in this way, with funnels over them

and tin tubes running into the outer air. The lamp-smoke is thus got rid of, while the tube acts as an extraction flue for breathed air. It should be remembered that gas exercises a bad effect on the air of a room, rendering it impure and unwholesome. Ordinary gas-burners consume from three to four cubic feet of gas per hour; and it is found that one cubic foot of gas destroys the oxygen of at least eight cubic feet of air during combustion, besides producing impurities. To dilute these impurities and to replace the oxygen, fresh air, for this purpose alone, must be brought in, to the amount of eighteen or twenty thousand cubic feet in the course or an evening for each burner lighted. Nearly as much air is needed for burning a pint of oil as for ten feet of gas. As little gas as possible should be burned in hospital wards. If, instead of gas, oil or kerosene lamps are used, it must be borne in mind that the commoner kinds of oil—that is, those that smell disagreeably—are extravagant, unhealthy, and dangerous. Both for health and safety, lamps of all kinds should be kept clean and in order, and only a good quality of oil or fluid used. Gas leaks should never be tolerated. Electric lights will do away with many of the objections to the use of gas or lamps.

Impure air is a very sluggish thing; it is *dead air;* it will not find its own way always to a particular hole in a wall and leave of its own accord; it must be compelled to go. A mining engineer has said that "air is like a rope; you can pull it better than you can push it." There must be forced

ventilation by some device or other in closed places and the extraction method, by means of heated flues, is safest and simplest. Where there is a closed but heated chimney, running up through a room, a register for the exit of foul air may be put in such a chimney near the floor; the opening must be shut when the stove or fire which warms the flue is lighted.

Tobin's tubes.—The system known as Tobin's tubes has been found effectual in England for the admission of fresh air into old buildings. The room to be ventilated should have an open fire. All good English systems depend on open fires. On the opposite side tubes are brought through the outer wall at a point breast high; they are bent at a right angle, and are carried up the face of the wall, five or six feet or more, like organ pipes; they discharge fresh cold air, which mixes with the air of the room, and descends without creating draught. The tubes are better left exposed, as they are thus somewhat warmed by the general air of the room, but different plans of concealing them are followed where that is desired. Other methods for the inflow of fresh air, such as perforated cornices, perforated bricks, or slatted openings in outer walls, must be left for architects to describe. Whatever scheme is adopted, it will be well to make it ample for a large influx of air at the summer temperature, because in colder weather a certain proportion of the openings can be closed or regulated. No arrangement of flues need be used in a one-story ward or a top-story ward, for openings at the

roof-ridge, and windows, may serve all purposes. Revolving caps on air-flues only answer in a wind. In a calm all such devices obstruct ventilation.

Ventilating fans.—City hospitals are sometimes provided with forced ventilation by means of a fan, or by one central aspirating chimney, or both; the fan pumping fresh air in, the aspirating shaft being supposed to draw foul air out; but this is expensive, intricate, and often untrustworthy machinery; each ward needs a chimney to itself; no single aspirating chimney can do all the work which it will be set to do in a large hospital. Besides, when the wind shifts, or the temperature varies, the air-current is sometimes reversed, and the apparatus may be of no avail; while the use of open windows and fires is almost precluded—windows being used for light only, the cracks around them actually stuffed up, and the whole dependence placed on artificial ventilation. City hospitals which desire and can afford to have a ventilating fan should run it by a separate engine, independent of the regular heating apparatus, so that it may work without break, day and night, in summer as well as in winter. If continuous use is not feasible, the fan should certainly be driven every morning and evening, say from 5 A.M. to 8 A.M., and from 7 P.M. to 10 P.M., for it is at these times that the air of a ward grows most foul and most needs to be thoroughly cleaned out.

Open windows.—But ventilating apparatus which may be necessary in crowded cities, and with superimposed wards, would be superfluous in an

open space where one only needs to keep up fires, or to throw open the windows in order to admit free air and sunshine. In some of the points vital to success visitors may feel that their little country hospitals have the best chance. The simplest and surest ventilating fixtures are open windows, open doors, and open fires. In the majority of instances opening the ward windows and doors must be the chief dependence. To ensure attention see that the window arrangements, whatever they may be, are not intricate, but simple, manageable, and always in repair. See also that the windows are systematically opened, and that some one person has the matter in charge; what is anybody's business is nobody's business, and is never done.

Sashes may be left three inches down at the top on the sheltered side of a ward, in ordinary weather, without injury to any one. They can be open even in winter, for a few minutes at a time, every hour or two, the patients being covered with blankets meanwhile to protect them. In summer weather windows of course should be left wide open constantly. But where there are windows only on one side of a room, the only door being opposite, these may all stand wide open and yet an observant visitor will find the air on each side of the door, and in the corners, or behind the door, very slowly stirred, if at all. It is still worse where the door is not opposite the windows. All such rooms are unfit for surgical patients; hence the best plan and the only one admissible in new constructions is to have windows on opposite sides of a ward and no blank

walls anywhere. Where there are transoms over all the windows, it is a good plan to open every other transom, and raise the opposite corresponding window from below a few inches, placing vertically on the sill a board about twice as deep as the opening, that is, overlapping the sash when the window is up, and an inch or two removed from the window. An interchange of out-door and in-door air goes on without any direct draught upon the patients.

Window ventilators.—There are several other devices and forms of window ventilators which are simple and effective for winter use. One has two bent tubes like stove-pipe elbows thrust inward through a strip of board, with valves in the mouths. This board may be set at either the top of a lowered sash or at the bottom of a window, under the raised sash. The fresh air is driven to quite a high level by these tubes, then falls and mingles gradually with the air of the ward. Close wire-netting makes a useful shield, checking a draught by minutely dividing the air-current as it passes through. Flannel or unbleached muslin ventilators may be easily provided by stretching the cloth on light wooden frames about a foot in depth. The frames may be folding ones, hinged in the middle and fitting the top of the window as they are opened out, and the edges grooved to slip close over the window cords. The window is lowered at the top, the frame inserted and then pushed up into place. Whole window-sashes for ventilation are quickly made, for summer use, or in temporary huts, by stretching stout muslin on frames and fastening it with moulding strips

and headed tacks. But all such dust-sifters are air-stoppers, and windows so shielded must not be counted on as giving the same amount of air that an open window would give. Care must be taken to cleanse frequently all ventilators, and also all wire gauze, flannel, or cotton cloth used in the way described, or at the mouths of air-shafts. Another good window arrangement is a board or thin sheet of metal or extra glass sash, with leather sides permanently rigged at an angle and dropped slightly forward like a wall pocket, in front of a lowered top sash. A triangle of wood may be nailed on each side of a window-frame, at the top, so as to close the side openings whenever a transom is let down.

Currents of cold air thus admitted are first directed upward as they always should be. Currents of air admitted on a level with the beds are often undesirable; they drive the odors of one bed across the rest, and are apt to chill the patients. Currents of fresh air admitted near the floor keep the feet cold. Even volumes of warm air sometimes come through wall registers with force enough to make a patient imagine there is a "draught," and slily shut the register if it is within reach. Such registers may be fitted with a screen to turn the air upward. Vertical currents are safer for sick people than horizontal currents. The nearer the centre of a ward and the higher up the fresh cold air can be allowed to enter, the more perfect will be the circulation, especially if there are outlets for foul air in or near the floor, *in which an outward flow is really kept up.*

Air-currents have a tendency to cling to and fol-

low surfaces they come in contact with. Where inlets for fresh air and outlet flues are on the same level, as, for instance, with a lowered window and a foul-air register near the ceiling, there will be a draught but no diffusion of air. Or if both openings are on a level near the floor, as with a window raised at the bottom and an open fire, the same thing will occur; the fresh air will escape too soon without diffusing itself properly. Openings for the two purposes should be on opposite sides of a room, if possible, and at different heights.

Open fires.—Draughts are not ventilation; cold is not ventilation. To allow open windows in cold weather there must be an overplus of heat. The best winter ventilation accompanies the best mode of heating, namely, by open fires. Open fireplaces in the centre of a ward are a delightful provision. A slide at the back of the hearth, through which ashes fall into a fire-brick ash-pit and are removed from below, obviates some of the objections to open fires, such as noise and dust. One open fireplace, with a wide chimney throat, in each ward, *with a fire in it*, whenever cool weather allows, is all-important for cheerfulness and ventilation. But large wards in hospitals, heated by only one fireplace or stove, are sometimes wrongly believed to be "well-ventilated," because air is found rushing up the chimney or pipe. The main points are to know the quantity of required air, and the quantity of outgoing air, and whether the diffusion of fresh air is general throughout the ward, and where the supply comes from. A large fire to burn very briskly re-

quires from five to six hundred cubic feet of air a minute, and will suck this air from wherever it can get it. The waste-pipe of a wash-basin or other sewer connection may feed a room with air in this dangerous, unsuspected way unless there is a stronger current of clean air from outside provided.

Stoves of the right sort act in a measure very much as open fires do. They suck out the stagnant air, create a current, and thus encourage the entrance of fresh air. A pan of water should stand on every stove to modify the dryness of the air. Soapstone is the proper material for stoves, but even an iron stove, when it has an open Franklin grate, may be so arranged as to help ventilation, the smoke-pipe being double-cylindered and the outer casing used for warming fresh air, or for extracting the foul air of the ward. The latter method is the one adopted in the cottage ward described in the appendix.

The heating arrangements in the Warren Ward, Boston, before alluded to, are as follows: In the centre of the ward, which is a square ward, is a chimney-stack, on two opposite faces of which are open fireplaces, and on the other two, open Franklin soapstone stoves, the flues of which are four iron pipes, placed inside the stack. For auxiliary heating there are four steam radiators hung beneath the floor and supplied with fresh air by four ducts from outside, with hot-air registers in the ward floor. Further ventilation upward is provided by foul-air registers in the ceiling, opening into a large centre-roof ventilator; and downward by twelve foul-air registers in the floor, connected with the chimney-

stack by foul-air ducts running between the floorings. This method, which has been in use since 1873, has proved so satisfactory that the authorities of the hospital have put it in practice in subsequent constructions.[1]

Registers.—An undesirable detail of the plan described is the position of the hot-air registers. Hot-air registers should be put in the walls, rather than in the floors; floor registers tempt patients to sit or stand over them; dirt collects in them; and careless men have even been known to use such floor registers as spittoons. No registers used with heating apparatus, or at the mouths of ventilating flues, in either hospitals or houses, should be set permanently in the walls. They should be made movable by unscrewing the metal frame without breaking the plaster, so that the mouths of the flues may be regularly cleansed. Fluff collects and packs in such places, and they become literal hot-beds of disease.

Fireplaces.—Some of the United States marine hospitals are warmed on the plan adopted in Herbert Hospital, Woolwich, England. There are two Galton fireplaces, back to back, in the middle of the ward. The chimney is not allowed to obstruct the ward, for it passes downward and under the floor, and, on reaching the outer wall, enters and is carried up through the middle of a fresh-air flue. The latter has an opening into the ward near the ceiling. By this plan, a volume of outer fresh air is warmed several degrees in its passage to the ward, thus utilizing

[1] Dr. J. H. Whittemore, Resident Physician and Superintendent.

the escaping heat of the chimney. Or the proces may be reversed. If it is preferred that the smok flue shall be carried directly up through the ward, instead of downward through the floor, it may be a pipe of fire-clay, so as to take up less room than an ordinary brick chimney. The fresh air may be brought in from outside by means of a tube laid under the floor to a point near the fireplace, or below the grate. It is then conducted upward on both sides of the smoke flue, or in a larger tube forming an outer casing for the chimney. The air, having been warmed in its passage, is then passed into the ward through one or more openings near the ceiling, around the top of the tube. This system is in use in the new wards of the London Hospital and elsewhere, and is found effectual.

In some army-post hospitals, double fireplaces are used with success, fresh air being let in between the fireplaces and warmed before entering the ward. Properly built and managed, such a fireplace has been found to heat satisfactorily a room forty-eight by twenty-five by twelve feet, and to ventilate it at the rate of forty thousand cubic feet of air per hour, the out-door temperature being at freezing-point.[1]

Visitors must see that where there are ward fireplaces the chimneys are not stopped up, and the empty spaces behind the blowers used as receptacles of rubbish, or cupboards for old shoes. A hospital visitor in a neighboring State writes: "I have just come from putting my head up the chimneys of our

[1] Public Health Papers, vol. ii, p. 386. For descriptions of ventilating fireplaces, see also Sanitary Arrangements for Dwellings, Wm. Eassie, London, 1874.

fever ward, where I made the discovery that four nice, open, wide chimneys, giving the best possible chance for ventilation, were neatly and tightly fitted, so as not to attract an eye that was not directed up them, with boards nailed in at the request of the patients, while at the same time four ventilators were tight shut, and also all six of the windows."

Furnaces.—In a large building, in such a climate as that of New York, open fires cannot be exclusively depended on. Some sort of heating apparatus will be needed in winter, and has advantages in the administration of a hospital, being labor-saving, cleanly, and quiet. But the air introduced by furnaces into a ward is, unfortunately, often surface air, drawn through damp and dirty cellars, and then scorched by over-hot iron. Add to these objections the fact that the temptation with ignorant employees is to shut off all ingress for cold air to the furnace, either to increase the warmth, as they suppose, or to save the fuel. Steam coils, or preferably hot-water coils, hung beneath the ward floor, with ample supplies of fresh air directly from outside and taken at a level above the street dust, would be the best method of heating. The ground level is less often reached by fresh breezes than higher levels. To keep down dust, the ground about an air-box should be kept sprinkled with water. The box must have a wire netting at the mouth, must be kept away from all drain and sewer openings, and should run to the free air, not stopping under a piazza, for instance. The box or pipe might be of sheet metal; it must be caulked tightly at the seams if wood is used, and

wrapped with steam-pipe covering to keep out dust and cellar air. A thin flannel, often cleansed, may be stretched over the wire grating at the mouth, as an additional guard. The cellar or basement floor where a furnace stands should be impermeable. A concrete flooring with a coating of asphalt is the best. The evaporating pans of furnaces should be large and frequently cleaned out, as the water is liable to become impure. The air-box and air-chamber should be amply large. A large body of air gently heated is better than a small current of air heated to a greater degree; because the former is more likely to mix thoroughly with the air of a room and diffuse itself, instead of only rushing through. Have two air-boxes, to be opened or shut according to the direction of the wind. If possible, take air from the sunshiny side of the building. Each ward of a hospital *must* have its own separate hot-air pipes. The attempt to use one pipe to warm two wards or stories will result disastrously. It creates a common atmosphere, and may at any time spread contagion.

Radiators.—Of all methods of heating, the most undesirable is that by means of direct radiators, or stacks of hot pipe carried into the wards, collecting dust in their coils, and actually cooking this dust, and whatever other solid particles the air of the room contains, for the patients to breathe. Such radiators are only suitable for warming corridors and passages under favorable circumstances, where volumes of fresh air are necessarily constantly admitted. But whatever the system, bright, open

fires should be the accompaniment. Under all circumstances, when *any* heat is needed have the open fires burning. Use steam-pipes and furnaces only as an addition to these.

In pleasant weather with wide-open windows, or in winter with ample heating apparatus, the question of air-supply is not a difficult one. The really trying time for a hospital ward is in the intermediate season; the dull days in early autumn before the fires are started, or in spring when they are "banked," and the mornings and evenings turn chilly, and the nurses and patients shut every crack, and the ward atmosphere stagnates. Then is the time for an armful of wood, or a hod of coal, and a bright, cheering, open fire. But "eternal vigilance" is the price of hospital hygiene. If a superintendent is intelligent enough, and unremittingly attentive to little details, the vexed problems of ventilation and heating will be very much simplified. An engineer cannot dictate the ventilation unless he is a very uncommon man; only an enlightened person who has studied the subject and has sufficiently sensitive perceptions to tell whether air is clean or dirty can do this. The main object of the ordinary engineer is to save coal and get credit with the managers for economy. But what is thus saved in fuel is spent in flesh and blood.

IV.

Drainage and Water-Supply.

One of the radical necessities of a hospital is an abundant supply of water, free from the slightest taint or suspicion of impurity. Of equal importance is a safe and prompt method of taking away the fouled water of the house and the dejecta of the inmates. These are matters which visitors must carefully investigate, not resting satisfied with the assurance of interested persons that the drainage is "all right." They should understand what right drainage is, and see for themselves whether correct principles are followed in the institutions they visit. The evil consequence of defective plumbing is a familiar subject in cities. Similar evils exist in country neighborhoods, sometimes unrecognized.

Clean water.—A good part of sanitary science may be summed up in one word—cleanliness : clean air, clean soil, clean water. But in many towns the soil is honeycombed with cesspools and wells alternately, while ponds and streams are poisoned by drains discharging directly into them, or by rain water running over or through a surface made foul with house-slops and refuse. It is a common thing to see a well in such a position that it catches barnyard or privy leakage, even if it is far enough from the house to escape the taint of kitchen and laundry

slops thrown out on the ground. Drinking-water, which organic matter has thus been allowed to foul, becomes a fruitful source of disease and death. The clearest, most sparkling water, is sometimes the worst poisoned. The safer plan for hospitals is to avoid the use of well-water for drinking and cooking; and in the absence of a public supply of pure water, to substitute rain-water, filtered through *finely-powdered* animal charcoal, or carded asbestos. These filtering substances should be renewed, or cleansed, from time to time, by heating them. The charcoal can be made very hot in an iron pan over the fire, and asbestos is purified by holding it in an open flame.

Soakage from cesspools.—An inverted cone, with its apex supposed to be at the bottom of a well and its base at the surface as broad in diameter as the well is deep, would correspond in a general way with the area from which a well draws moisture. The deeper the well the larger the area drained. But most wells drain a wider region than their depth indicates; and if sunk in an impervious stratum, or on a hillside, or where some dip in the subsoil favors it, may draw their supplies from several localities many rods apart. On a peopled hillside pollution of wells and of ground-air from vaults or leaky cesspools further up the slope becomes inevitable. One of the reports of a health officer for Oxfordshire, England, gives a striking illustration of the distance which foul leakage may travel. In consequence of the escape of the contents of a barrel of petroleum which had been

buried in an orchard, a circuit of wells sixty feet lower down and nine hundred feet distant became so tainted that the occupants of fifteen houses, containing eighty-two inhabitants, were unable for ten days to use the water for drinking or cooking. Had this soakage been sewage it would not have been so quickly detected, and the result might have been wholesale water-poisoning and an outbreak of typhoid fever. Nine out of ten cesspools do leak, and are built purposely to leak, to get rid of the trouble of emptying them. The action of frost, the jarring of the earth, and other causes may practically prevent cesspools from being tight where tightness is the intention.

Earth-filtering has been proved by a series of important and interesting scientific experiments to be of little avail, as a barrier between wells and the infection that may come from cesspools, vaults, cemeteries, or other sources of impurity, even if these lie at a considerable distance in a lower, wet stratum. The practical conclusion reached is that a building may stand on a thoroughly dry body of sand or gravel, with its cellar above the ordinary level of ground-water, and yet may be in danger of having not only its well-water but the air of its rooms contaminated from leaching cesspools; for if the drift of the leaching be toward the cellar, very wet seasons may extend the polluted moisture to the cellar walls.

Ground-air.—Besides water-poisoning, the poisoning of the contained air of the soil by the infiltration of organic filth has a serious effect on health. The air with which the upper soil is permeated

vibrates to barometric changes in the outer atmosphere and to changes of the thermometer, and will rise when the level of the water in the ground rises. Heavy rains may therefore aid in forcing the ground-air into cellars. Houses act as chimneys for the soil on which they stand, and especially in winter, when the surrounding ground is frozen, will suck the air from the pores in the soil, through the foundations and cellar floor, if these are not of air-tight material—cellars being usually warm and protected from frost. Air or gas having no other escape, will readily press through any ordinary brick or sandstone wall.[1]

It is for the reasons here indicated, among others, that hospital wards should be raised above the ground on piers or open arches.

Ferments.—Every time a pailful of dirty water goes into a cesspool an equal bulk of foul gas must find its way somewhere, carrying infection with it. The likeliest way of escape for it is into the house by untrapped or badly trapped waste pipes. With the intention of diminishing the volume and pressure, cesspools are sometimes arranged with overflow pipes, or are used as catch-basins and connected with a sewer which carries off part of the liquid waste. But the foul sediment remains stored up and is subject to dangerous fermentations. Grease and foul slime and soap often plaster the insides of pipes and cesspools and clog the outlets and overflows, causing backwater into a

[1] See Filtering Capacity of Soils: Report of Professor Raphael Pumpelly, Supplement No. 13, National Board of Health Bulletin. Also Relation of the Air to Dwelling and Soil: Max von Pettenkofer.

building. Small quantities of liquid deodorizers poured through the house pipes help to keep the traps and closet-pans clean, but can have no appreciable effect on the solid matter at the bottom of the cesspool. The overflow carries off a portion of the deodorizer immediately. The safer way is to empty, cleanse, and disinfect the cesspool itself often and at regular intervals, using copperas and chloride of lime freely, and at other times pouring down liquid disinfectants in much larger quantities than is commonly thought necessary.

Privy vaults should be abolished. Where they exist, visitors must recommend that they be cleaned out, the foundation walls and all the surrounding foul earth removed, and the pit filled with clean earth well rammed down. The buildings should be set up on short piers or locust posts, on level ground, and stout boxes made tight inside with a wash of hot coal-tar should be provided as receivers. In small out-houses, a petroleum cask sawn in two makes two good pails; but in large establishments a wheeled wagon or box is needed, which can be readily drawn off and emptied. A six-inch vent pipe through the roof should run up from under the seat, and an ample supply of dry, finely-powdered loam or sifted anthracite ashes should be at hand to throw down at every using. Care must be exercised by visitors in observing whether the out-houses are properly built and isolated, whether the contents of the boxes are kept fully covered, and whether the removal is done often enough and in a cleanly manner. No liquid house-slops should be thrown in.

The dryer the compost is kept, the better. If such out-houses are sufficiently remote from the water sources, and there is absolutely no odor attending them, they may be considered safe, but only as a temporary substitute for a good system of water-supply and sewerage.

Sub-surface irrigation.—The best method for carrying off the liquid wastes, that is, bedroom, kitchen, and laundry slops, in country institutions (where there is no proper sewerage and no outfall into a large, rapid stream the purity of which is not a matter of importance), is by sub-surface irrigation. The character of the soil and the configuration of the ground must both be studied in deciding the size of the distributing area. Unless subsoil drains are laid, heavy, clay soils must be excluded. The system requires the use of a flush tank, which may be discharged by hand, or, better, a Fields' flush tank with automatic discharge, strainer, and grease trap. It must be protected from freezing, and occasionally cleaned out. Without such a tank, the fluid might escape at the first point of leakage, and there would be over-saturation of the soil. The tank stores up the fluids for a few hours, and then sends them suddenly and copiously throughout the lines of open-jointed, small tile drains laid ten or twelve inches below the surface of the ground. There should be forty or fifty feet length of the tiles for each member of a household, in soil of average porosity. The foul driblets reach the ground at a great many points, and are oxidized by the air in the upper soil; and the roots of grasses take up a part of the

harmful matter. There is no limit to the amount of liquid sewage which may be disposed of in the way described, provided the lines of drains are spread over a large-enough absorption ground in proper soil to take up the water, the ground sloping gently away from occupied buildings. A grassy field or lawn, or other fallow, undisturbed ground, is required, not deep cultivated or ploughed land. The plan has been in use for several years for the entire sewage of Lenox, Massachusetts; at the Women's Prison, in Sherburn; the Nursery and Child's Hospital, Staten Island; and at many houses in New Jersey and elsewhere. No trouble from frost has been known to occur. The flow should be rapid and intermittent, and is usually warm enough to thaw its own way into the ground.[1]

Water-supply.—An insufficient supply of water is a frequent cause of annoyance and a source of danger in county-houses and suburban hospitals. Visitors must inquire into the best method of increasing the supply, and urge its adoption. There are windmills for pumping water from springs or streams, which may be brought into use where hand-pumping is out of place. The number of gallons of water required per day, per person, must vary with the construction of the building and the character of the inmates. Seven and a half gallons may be assumed as the minimum amount necessary for each person daily, in a poorhouse where there are no water-closets, and independently of full baths.

[1] George E. Waring, Jr.: Sanitary Drainage of Houses and Towns; also, Seventh and Eighth Annual Reports, State Board of Health of Massachusetts.

Hospitals need more water than other institutions; for besides the incessant laundry work and general cleansing, the utmost personal cleanliness must be maintained, not only in the case of the patients, but by nurses and attendants. A surplus of water in case of fire is essential.

Tanks.—With daily use of water-closets, and a full bath for each inmate even only once a week, the supply of water per day, per person, ought not to fall below thirty gallons. One person's daily supply will fill four cubic feet of space, every cubic foot of room in a tank being equal to a volume of seven and a half gallons of water. It will be seen that water reservoirs must be amply large and kept constantly full. A cubic foot of water may be counted as weighing sixty-two and a half pounds. House tanks and their supports should be strong enough to bear the strain of many thousand pounds of weight which a full tank represents. Under no circumstances whatever should tanks intended for drinking-water be lined with lead or zinc or galvanized iron. Such tanks, if they are necessary, should be lined with tinned and planished copper, or they may be of slate joined with hydraulic cement. They should be kept covered, and all tanks and reservoirs should be examined and cleaned out at regular intervals. Tanks of standing water sometimes breed mosquitoes. In mosquito-infested places, it is well to fasten a breadth of muslin over house tanks to prevent this annoyance, if there are no covers. Care must be taken to preserve and utilize rain-water by building tight cisterns; especially in deep-mining

districts, the more roof-surface there is the better. No rain-water leader should ever discharge into a drain or cesspool.

Overflow pipes from tanks or house cisterns containing water used for cooking or drinking, should never run into the soil pipe or drain pipe. Such overflows should discharge over an open sink in the kitchen or other suitable place. Overflows from water-closet tanks should empty into the closet-pan. Cistern overflows outside the building should be carried to some low point on the grounds and have an open outlet.

Drainage.—The healthful arrangement of the drainage in its minutest details and an ample water-supply for flushing sinks and drains are essential. The two are interlinked. It is a fatal mistake to introduce water into a village or a building, without first providing proper means of disposing of the increased volume of foul liquid which the free use of water will occasion.

Drain pipes within a building must of course be of iron, and they should be efficiently trapped either just inside or outside the walls. If continuous iron pipe is not used for outside drains the material chosen should never be brick, or wood, or loose stones. Heavy, well-vitrified, salt-glazed, smooth round tile is required, beginning at from five to ten feet outside the foundation walls. These pipes must be laid carefully in a firm bed of gravel or concrete. They should be well joined with hydraulic cement, kept out of the way of roots of trees, and should have the proper grade. A minimum

velocity of three feet a second will usually prevent deposits in a drain. Drain pipes should have their own trench distinct from the one in which the water-supply pipes are laid. The quantity of sewage discharged every day will vary with the amount of water used. The rate commonly assumed by engineers ranges from thirty to sixty gallons of sewage per head, per day. A smooth, well-laid six-inch pipe, with a descent of one foot in one hundred feet, will discharge, when running full, about four hundred thousand gallons every twenty-four hours, and prove large enough for the largest institution, or excluding storm water, for a village of a thousand or more inhabitants; while in the case of small institutions, a four-inch drain is often all that is needed.

Small sewers are better than large ones. They are more apt to run full at times, and are thus kept better scoured. Large sewers, except in heavy rains, usually carry only a sluggish trickle of sewage at the bottom, in contact with a large volume of warm, contained air. We have thus heat, moisture, darkness, and the presence of ammonia; all the conditions favorable to the development of noxious germs and gases.

Exhaust steam in hospitals where steam is used must never be discharged into a drain. An upward rush of moist, warm vapor may at any time break through the small traps of waste-pipes, and fill a room with its foul cloud, while fermentation in sewers is dangerously increased.

Unseen leaks from foul drains running within

or under partition walls will soak a wall or fill a partition space with sewage undiscovered. The drainage system of all buildings is subject to constant strains and injuries, stoppages, flaws in metal, displacements by frost or flood, or by settling of walls; and pipes, in a hospital especially, need inspection and periodic testing, as do steam-boilers and other machinery. Waste-pipes and water-pipes in a house, therefore, should be laid exposed to view throughout their length. In parts where it is thought best to conceal them, it should be done by wooden covers screwed on, not nailed, so that examinations may be more easily made. The best place for waste-pipes is along a wall, in full sight, at the proper incline, and hung by strong iron bands. Right-angle junctions must be avoided.

Soil-pipes must always be of iron, well tarred inside and out. Lead soil-pipes are forbidden wherever there are competent boards of health; such pipes are often corroded and otherwise injured, and foul gases escape without other leakage to betray them. Some disinfecting fluids injudiciously used will corrode lead traps and pipes. Cement joints are useless, and extreme care is needed to make lead joints perfectly tight. The lead must be poured in hot on a carefully packed stopper of oakum, and driven home, as it cools and shrinks, with tamping tools. The joints must then be tested by closing all outlets, filling the whole pipe with water, and letting it stand twenty-four hours.

Every line of soil-pipe should stand as vertical as possible and should be carried up full size, say four

inches in diameter, to a point near the roof; and from that point, with diameter increased to six inches, through the roof and several feet above it. It should be kept ten feet, at least, away from chimneys, dormer windows, and open rain-conductors that lead to cisterns, and its top should be two feet lower than the chimney tops, so that down draughts in the chimneys may not draw foul air in. There should be no return bend or cowl of any kind, as these check the air-currents. A coarse wire basket, mushroom shape, may be needed, as a guard, to prevent malicious meddling.

An inlet pipe for fresh air must be inserted near the foot of each line of soil-pipe, between that and the trap of the iron house drain. In towns, both trap and inlet pipe are usually under an area grating outside the building. In a country institution, the inlet pipe may be led to a little distance underground and brought out behind a tree, or in the shrubbery. It should have the same diameter as the soil-pipe, say four inches; its mouth must be kept away from windows and air-shafts, should have a wire strainer, and should rise above the surface of the ground enough to prevent clogging by dead leaves or deep snow. This inlet allows free communication with the atmosphere, and a constant current through the whole length of the soil-pipe. Stagnant, untrapped, unventilated pipes and drains are worse than no drains at all. Disease germs are generated in the slime and foul gas of house pipes as well as in sewers; but such germs may be carried off or rendered harmless by currents of clean air. A

building without traps and vent-pipes, itself becomes the vent for any common sewer it may connect with; or as Colonel Waring expresses it: "A house is often only a vertical section of a horizontal street sewer."

Vent-pipes for foul air are sometimes run from under closet seats into a chimney. In this case a special copper vent-pipe carried up inside or along the side of the heated flue is necessary. It is unsafe to use a kitchen chimney as a vent; for fires go out at night, and there will be downward draughts; or the pipe at the point where it enters the chimney may become choked with soot. All such ventilating pipes or shafts should gradually widen in diameter toward the top, whenever closets on more than one story vent into them.

Bricks are so porous and absorbent that they are a poor material for flues or shafts through which currents of sewer air must pass. The Health Board of New York City orders that "no brick, sheet metal, or earthenware flue shall be used as a sewer ventilator; nor shall any chimney flue be used for this purpose."

Ward water-closets must be built entirely outside the ward building, and separate from the ward by a lobby or short corridor with swing-doors and opposite windows. No visitor should pass without protest any other arrangement. The water-flow should be free and abundant. Closets where the flow is controlled by a spring on the door are often out of order. Closets where the flow is produced by pressure on the seat are always filthy. If auto-

matic fixtures are used the closets must be flushed with water every three minutes. There must be perfect self-working apparatus, or else perfect vigilance with a simpler plan—either will do,—or there will be perpetual bad odors and contamination. The old style of pan-closet, with its filthy container, should be avoided. Every closet must be thoroughly trapped. It is dangerous to draw on the main water-pipe to flush a closet. Each closet *must* have its own cut-off or water-tank; otherwise the foul air which collects above the trap, or the contents of the bowl may be sucked into the pipe when the water falls away in it, as often happens from the sudden turning of faucets elsewhere; and the main water-supply will be tainted. Flushing from the supply pipes is never so effective as flushing from special tanks.

Boxing in with wood should never be allowed in hospital closets. Wood so used easily becomes impregnated with foul water slopped about. A white earthenware closet on a tiled floor, with no woodwork except a hinged seat board of hard wood, and entirely open under the seat to ventilation and inspection, is the most cleanly and healthful arrangement. There must be partitions necessarily dividing one closet from another, but the woodwork should be as flat and simple as possible, without panels or mouldings, and should be constantly freshened and kept sweet by careful cleansing, and a new coat of paint or shellac. The closet partitions should not reach to the ceiling, and the doors should not come down to the floor, but a space of four

inches should be open at the bottom to secure ventilation, and a window behind the closets, opposite the doors, should give light and air. The seats should be at the ordinary level; there should be no step leading to them. The width of each compartment should be ample, say thirty-six or more inches; as feeble or lame patients often require the help of an attendant. Three compartments would serve for a ward of sixteen or eighteen beds. Closets and baths for nurses should be provided distinct from those for ward use.

Stationary urinals should have porcelain basins, if heavy glass basins are not procurable; and the best possible material for the slabs under and behind them would be heavy glass or large tiles. Slate slabs for this use are often unsatisfactory. They spot and stain and are absorbent. Where slate is used either for this purpose or as flooring and wall-facing in any room, large pieces should be chosen, so as to have few joinings, and the quality should be close and fine. Tiles, if used, should be large, well joined, and well fired with hard, strong glaze. The walls and floors of all service rooms should be of some hard, smooth, non-absorbent material; well-joined tiles are the neatest.

Flushing rims, or drip-pipes, around the edges of urinals, slop-sinks, closets, and basins, supplied with water from a special cistern, and worked either by hand with a special faucet and left running, or discharging automatically at regular intervals, are of great advantage. The sides of bowls and sinks are thus kept free from incrustations of filth. The sim-

ple lead drip-pipe can easily be added to old closets; the fixture is a cheap one.

Buckets and utensils for night use must have covers. See that these and the bedpans and commodes for patients who are too ill to go to a closet are washed daily, covers and all, in hot water and soda, and that disinfectants, in cases of a communicable character, or of dysentery, typhoid fever, and the like, are used to cover the discharges and to rinse the vessels afterward. All such vessels and pans should be left exposed to the weather, daily for several hours. The woodwork of commodes must be sweetened by an occasional rub with oil and turpentine.

Lavatories, baths, and slop-sinks should be in windowed rooms detached from the wards in the same way as the water-closets; and every bath, sink, and wash-basin must be separately and efficiently trapped as near each fixture as possible, and the trap protected against siphonage by a vent-pipe carried independently through the roof. Lavatory bowls with flushing rims are manufactured, and are the most cleanly kind. But do not multiply set basins. The better way is to have porcelain or polished marble or planished copper wash-sinks, and for special patients china or tin hand-basins that may be numbered and kept separate. Zinc or lead lined slop-sinks are very undesirable. Funnel-shaped sinks of copper, heavily tinned inside and out, not boxed in, and standing detached from the wall near an open window, are best. Frequent breakage of vessels will be prevented if the faucets do not over-

hang the sink, but if a rubber tube attached to the faucet is used for rinsing.

Hospital bath-tubs should stand free from the wall on all sides. Painted iron baths and sinks are objectionable. They require frequent fresh coats of paint, with the consequent inconvenience of turning off the water and disuse for the time. Enamelled iron chips and scales. Heavy planished or tinned copper is a suitable material, wears well, and the old copper is worth something at the end; but nothing is more cleanly and non-absorbent for hospital use than porcelain. All closets, sinks, lavatories, and baths must be most carefully examined by visitors to see that they are kept daily scrubbed and disinfected and periodically flushed, and that the fixtures are of the best attainable pattern and are always in good order. No sink, or closet, or bath waste should ever have any odor.[1]

A tinned copper bath-tub, full-sized, on rollers, ought to be on hand in every hospital, with apparatus for filling and emptying it, so that if the bath-room is remote, a very sick person can have a bath near his bedside. Any simple, country hospital can provide this convenience, which is not often enough thought of in the largest institutions. The expedient, however, should only be resorted to in extreme cases, as the emanations from baths, especially warm ones, are bad for the rest of the ward.

Visitors should ascertain what are the rules of the hospital as to the number of baths a week taken

[1] For details see file of *American Architect;* also House Drainage and Sanitary Plumbing: Wm. Paul Gerhard, N. Y., 1882.

by convalescents and nurses, and whether these rules are enforced. The purity of the air of a ward and the general cleanliness will be promoted where frequent baths are insisted on. Inquiry should be made by visitors as to the abundance of the hot-water supply, or the method of getting hot water in the night, as well as by day, in all parts of the hospital. This is an important matter.

Ice, which is so indispensable in hospitals, should be as pure and safe as the drinking-water. If it is cut from ponds or streams which receive drainage or seepage from foul sources, it is unfit for use. Water in freezing does not entirely free itself from the solid substances it may contain; these to some extent remain entangled in the meshes of the ice; and germs of an infectious nature have been found to withstand a temperature many degrees below freezing. Whatever objection attaches to the use of contaminated drinking-water, attaches equally to ice frozen from it. Such ice will, moreover, taint the atmosphere of ice-chests, and poison the food with which it comes in contact.[1]

Refrigerators and meat-rooms should never under any circumstances have direct connection with sewer or soil-pipe. The drip-tube, where convenient, may be carried through a wall and drip in the open air; or it may drip into a wide pan, exposed to the air, and the pan may have trapped connection with some near waste-pipe.

[1] Dangers of Impure Ice: Professor Raphael Pumpelly, U. S. Geological Survey. See *Sanitarian*, May, 1882.

V.

Some Interior Details.

The question as to what makes the best wall-finish for a hospital is still an open one. Professor Pettenkofer, of Munich, says that much of the necessary ventilation goes on through the walls, and that men ought not to live in wall-tight rooms any more than they ought to wear water-proof clothing continually. To make a wall impermeable is somewhat like varnishing a man's skin to keep his underclothing from being soiled.[1] A good, hard-finish surface, which, after the wall has thoroughly settled and dried, can be painted a light, cheerful tint, and is then easily scrubbed down with soap-suds and dried, is so far the most generally approved in this country and in Europe.

Wet walls.—It has been frequently noticed that in new hospitals or in new wards added to old hospitals the results are at first not so good as was expected; cases turn out badly; erysipelas and other hospital diseases appear. This state of things is partly accounted for by the fact that generally the new hospital or the new addition has been built under the pressure of necessity for more accommodation, and the wards are occupied too soon—before the walls are dried. The quantity of moisture held

[1] Dr. J. S. Billings, U. S. A.

by such a mass of fresh mortar and plaster is very large. Wet walls are air-tight; this is one hygienic disadvantage. Besides, wherever there are warmth and moisture, emanations from the bodies of the sick will be absorbed and held by such damp walls, and eventually cause disease. Time is required to evaporate the dampness and make the walls safe. Wet washing of new walls should never be attempted; they should be scraped and dry rubbed.

Wall finish.—Brick walls, whitewashed, are sometimes chosen as healthiest for the workhouse hospitals in England. Where cheapness is an object, periodical scraping and whitewashing of walls and ceilings with lime, not kalsomine, will be found as safe and cheap a treatment as any. Visitors may do good service by noting how frequently the whitewashing process is attended to. It should be done not less than twice a year, but the frequency should depend on the character of the cases for which the ward is used. Wards must be emptied in rotation, for a week or more at a time, so that the scraping, which is a dangerous process to health, may be thoroughly done. After ten or twelve years, if the hospital is a permanent building, the plaster ought to be torn out and replaced. The post hospital at West Point, for instance, is arranged with this necessity in view. Coarse, painted wire-netting is used instead of ordinary lathing. The plastering is laid on this, clinching on both sides of the wire, and the whole wall lining can be removed when desired.

In one of his army reports, Dr. Billings describes the method of lining the inside of a barrack—walls

and ceiling—with canvas, thickly coated with white-wash. He thinks this plan might be resorted to in old hospitals to tide over an emergency until alterations and improvements can be made—whatever germs of disease the old walls and cracks may contain being harmless so long as they are kept dry and covered up. But in speaking of the same subject elsewhere, he says: "I believe that the causes of disease in hospitals are more often in the bedding, furniture, and utensils, and in the attendants, than in the walls or floors."

Curved corners.—In plastering the walls of a new hospital, it will not cost much more to round or curve all the angles and corners. There should be no sharp angles in the wall corners, or where walls and ceiling join. Late specifications for marine hospitals require that no ceilings be plastered. The rafters and beams are smooth-finished, filled and covered with two coats of "pellucida" varnish; the open roof adding considerably to the air-space and helping ventilation.

Floors.—New floors should be laid with hard, close-grained wood. Narrow strips of the heart of yellow pine, well filled with rosin, make the best floors; the seams being tongued and caulked with white lead to insure an impervious surface, and the strips chosen and sawed with reference to the grain, so that there may be no chipping. Oak, in our climate, even when kiln-dried, shrinks and goes on shrinking, making bad cracks. Iron floor joists, filled between with hollow blocks of concrete, have the merit of being fire-proof. Carpenters should

never be allowed to leave under floors, or choking the flues, sawdust, chips, or other substance likely to decay. Plasterers also need watching.

Shellac makes a good surface for small hospital floors. It can be wiped off more readily than paint, and takes a good polish under a dry rub. It should not be washed with hot water. Dirt spots on waxed or oiled wood should be cleaned off with turpentine before fresh oiling. Old floors with which nothing else can be done should have the cracks filled in carefully and then the floors made neat and cheerful-looking by two or three coats of good gray paint and a broad, bright-painted border. A daily damp rub and dry rub with cloths will then effect the purpose of taking away the dust far more thoroughly than a flourish of brooms or any amount of mopping and slopping with dirty water. Old, unpainted floors must of course be scrubbed with hot water and soda; but the reckless use of water, even in that case, should always be avoided; it soaks into cracks, runs through to ceilings below, and leaves dampness; it helps decay, makes wood floors spongy and porous, and creates pockets for dust and disease.

The woodwork of a ward, of which there should be as little as possible, should be severely plain and flat, without angles, mouldings, or ledges to catch dust. It should be of hard wood, or kept freshly painted, or treated in a way to allow damp wiping and drying. Dust in a hospital is in good part organic filth, and should be wiped away with damp and then dry cloths as the surest way of removing it. Feather dusters and dry flapping should be abolished.

The hospital bed is the unit of the hospital. Hygiene, therefore, begins with the bed. For ordinary use, even when hair can be afforded, fresh oat straw makes safer beds; for the reason that hair beds are too expensive to be destroyed, and are seldom thoroughly cleansed, while straw beds may be washed and freshly filled for every fresh patient, or as often as necessary. Woven-wire beds have advantages for certain cases, a pair of blankets or a quilt being spread under the patient, and the permanent hair mattress, which is a prolific source of filth and infection, got rid of. But for bad surgical cases, or seriously ill people, sometimes woven-wire beds are not steady enough, or are cold and hard, and a thin mattress of some kind must be added. Some cases will hopelessly infect and ruin mattresses, and for such, bed sacks and pillow sacks filled with straw must be used. Some of the hair mattresses may be made in sections, for if one section or division is spoiled, it costs less to renew it. Patients sometimes complain of such section mattresses that they separate and make cracks; the sections should therefore be strongly tacked together.

The top surface of the bed should be at a good height from the floor, for the convenience of doctors and nurses; thirty inches is the approved height for the general run of cases, but the height will vary with the case. A high bed keeps the patient above the draughts and out of the layer of foul air which is apt to be near the floor, if anywhere, and the space under the bed is more readily seen and kept clean. For convalescents who can get in and out of

bed and help themselves a low bed is more desirable. The bedsteads should be made entirely of iron, sides, end bars, and all, no wood being allowed in the structure. They should be painted a cheerful color; in some hospitals they are painted a bright red, and the effect is pleasant.

An air-bed or water-bed for every surgical ward is necessary. A sectional air-bed, made by buckling together large india-rubber bags, about twelve or fourteen inches wide, and as long as the width of a hospital bed, say thirty inches, is used in the General Hospital, New Haven. All or only part of the sections may be required. When empty they take up little room, and are a convenient form of bed for private family use in case of sickness, as well as for hospitals. A water-tank bed of a good pattern is in use in the Hartford Hospital, which cost about $48, including the iron bedstead. Where complete outfit can be afforded there should be apparatus for lifting or holding up patients steadily and gently while the bed under them is changed or wounds are dressed. There are patent beds and fixtures for this purpose.

The furnishings and apparatus of a hospital ward should be as few, as simple, and as easily kept in order as possible. The multiplication of all sorts of contrivances means so much more needless labor and expense in cleaning and repairing them; and the sight and use of a variety of appliances about him is exciting and exhausting to a weak and nervous patient. The bed, a small table with a drawer or under-shelf, and a chair for each patient, are the chief articles of ward furniture. The wooden furniture

should be of a washable kind: the chairs *without upholstery*, of as easy a shape as can be had; the ordinary hard, small-seated "hospital chair," is cruelly uncomfortable. A couple of large-wheeled rolling-chairs are needed; and a few Boston rockers, and canvas—not carpet—camp-chairs, with arms, are a comfort to feeble patients. Where cushions are required they should be leather-covered, or calico pillows filled with chaff, which can be constantly emptied, washed, and refilled. Stuffed chairs, baize doors, worsted screens, and all fuzzy, woollen surfaces of either furniture, bedding, or clothing are unclean and unwholesome. No bed-carpets or rugs should as a general thing be allowed, and no bed-curtains. If there are such, the rugs must be aired and shaken out-of-doors every day, and the curtains constantly changed and washed.

A few bed-screens are needed, and may be easily made by stretching stout cotton or linen, on light folding clothes-horses. Use tape strings, so that the covers may be taken off, washed, and replaced, or use a light metal rod, fitting in a slot of the frame, and run through a hem on the edge of the linen. The frames should be painted, or treated in a way to allow washing them all over constantly with water or a little turpentine. Screens put about a bed where there is a case with offensive odor, may be made useful by keeping the linen cover wet with a brush dipped in evaporating fluid deodorizer.

There should be a few bed-rests for each ward; and a few lightly made bed-trays or bed-benches for the meals of patients who are in bed. They

should be long enough and high enough to clear the limbs, and are put across the lap, resting on the bed and taking all weight off the body. Common pine treated with shellac answers. They should be two and one half feet long, about fourteen inches broad, and the legs or bench ends should be ten inches high. A low rim should run round three sides. A light lifting-chair, with handles so aranged as to keep the seat level in going up and down stairs, or a canvas and poles, are greatly needed in two-story buildings, for carrying new patients up stairs, and a stretcher on folding legs, for accident cases, should be at hand.

Glass lotion pans and glass urinals are the best. Glass ought to be used for many more purposes in hospitals than is common. Brass dressing-basins, shallow, and with convex and concave sides, so as to fit different parts of the body, are useful. *Papier-maché* basins and pails seem light and neat, but they soon absorb liquid filth, and are undesirable. Vessels of tin are extremely objectionable, as they cannot long be kept free from bad odor.

Medicine closet.—A locked cupboard with compartments, either standing or hanging against the wall, is the best place for keeping medicines. The partitions should always be movable, for convenience in cleansing. A cupboard four feet high, three feet broad, and six or seven inches deep, gives twenty good-sized compartments, besides shelf-room for the ward medicines, all under lock and key. A shelf to pull out under the cupboard, and one or two deep drawers for lint and bandages, are useful. Station-

ary medicine boxes on ward tables are objectionable; still more so are open racks of shelves in which liquors and opiates are accessible to every one. To save steps in a long ward, a cheap expedient is a common tin puff-pan, such as are used for baking, or two fastened together, with a firm handle run across. Two dozen sockets would be light. These could be numbered to correspond with the beds, and half the doses carried round at one time; some of the sockets holding small glasses with water, for swallowing after the medicine.

Surgical dressing-table.—A great assistance in a surgical ward, helping to save delays in fetching and carrying, is a ward dressing-table on noiseless rollers. A light, common, little hard-wood table, such as is used for children to play at, would answer. It should be from three to four feet long, and about two feet wide; should have a rim round the top, and should roll easily. There should be a shallow drawer for surgical scissors and plaster, and a deeper drawer for clean rags, lint, and bandages. The top holds the basins, alcohol lamp, hot-water can for heating plaster, and any other needed article. A bar across each end serves as handle and towel-rack. The whole thing should be no higher than the bed, up to which it could be moved with very little exertion; and it would take the place of the floor, two or three chairs, the bed-table, and the empty beds alongside, all of which are sometimes brought into requisition for the surgical dressing of one patient. Great care must be taken to cleanse every portion of this table and its drawers, and to

cleanse instruments which have been used, before putting them away.

For **patient's clothing** which is in daily use, a locked and ventilated room or closet with hooks and shelves, near by but not in the ward, is essential; otherwise dirty bundles, "back hair," and old boots will be found under the patient's bed, or between the mattresses. Some patients will be convalescents, able to take out-door exercise; others will be constantly in and out of bed, better one day and worse the next; and the nurse must have a place close at hand in which the outer garments, the hats, and boots can be kept and quickly reached. A good arrangement is a row of low, small closets built along the wall inside the day-room. Each patient could have a separate cupboard and the nurse would keep a common pass-key. The closets or rooms in which patients' clothing and ward linen are kept should be constantly examined by the visitor.

Managing and building committees, where these are all men, will find it an advantage to take counsel beforehand with some trained nurse, or some lady who has had experience in hospital service, in regard to ward apparatus and matters of interior detail. But hospital managing boards should always include women. A memorandum for the outfit of a ward of twenty beds is given in the appendix.

Ward dining-room.—Visitors should insist on a separate room for every ward, to be used as a dining-room, a bright, well-ventilated, sunshiny room, removed from the water-closets and bath-rooms. No eating should ever go on in a ward unless food is

carried to some really sick person in bed, or to some one whose presence at table would be offensive to others. Offensive or unsightly patients must be provided with meals in the ward, and explanation, if needed, be gently but firmly made to them. Meals are often carried to the bedside when a patient is perfectly able to—and might much better, for his own sake,—go into an adjoining room. Or, what is worse, a long table is sometimes set out in the ward itself, for all, in the midst of the repulsive associations of sick-beds; cabbage and carbolic acid mingling their fumes together. Get the convalescents away from their bedsides at the earliest possible moment; it is often the turning-point toward recovery. Give them a cheerful room, a neat table-cloth, *always clean* (a very little additional expense will prevent the abomination of a coffee-stained, greasy table-cloth), clean plates, bowls, and tumblers; somebody —convalescents in turn if you choose—to say a Christian grace before meals; a little pleasant talk; a glass of garden flowers or a basket of fruit and green leaves on the table; and you have taken a long step toward curing your patients, perhaps both in body and heart. Look in *unexpectedly* at meal-times to see that the dining-room apparatus, the dishes, spoons, knives, forks, and tumblers, are clean, and sufficient in number, and that the food is decently served and of good quality.

The general kitchen of a hospital is best situated on the ground-floor of the administration building—never under wards,—and the cook should have a proper number of assistants according to the size of

the institution. A hand wagon with shelves for carrying the diet is necessary in large hospitals. In a large hospital also, a small special kitchen for extra diet, with a special attendant, is very desirable; and here, if need be, nurses may be taught simple, sick cookery, which is an important part of a nurse's education. Nurses should not be allowed in the main kitchen. In some hospitals nurses are sent in squads to the cooking school, which is a recognized institution now, in cities. No cooking should be done in the ward or ward pantry. The large diet kitchens with ranges, sometimes attached to wards in city hospitals, are objectionable, and are often misused. A large, light pantry with a dresser for the table furniture, a sink with hot and cold water, a good-sized table, and a gas-stove or spirit-lamp for heating drinks or boiling an egg, a little refrigerator with a constant supply of ice for keeping drinks sweet and cool, are all the apparatus needed.

Musical instruments in a hospital are good things if they are managed with good sense and strict regard for the comfort of the majority. In certain stages of illness and convalescence the soft, long-drawn strains of good organ music, or of a sympathetic human voice, are soothing and delightful. On the other hand, the loud, sharp stroke of a pianoforte played in season and out of season, and played in the false and slipshod manner common in such places, is exceedingly irritating to the nerves of many sick persons, and therefore positively injurious. Sore complaints have been made to the writer by hospital patients on this subject. If musical in-

struments are kept near hospital wards no such thing as "practising" or indiscriminate thrumming for private amusement should on any account be allowed. If it is difficult wholly to prevent this abuse of instruments, they should be kept in some room out of hearing of the sick, and moved near the wards only on occasions of general worship or entertainment, or at times when they can be well and judiciously played for the comfort and pleasure of all.

Nurse's room.—A nurse, during the hours when she is on duty, ought always to command her ward. Her room, therefore, if it is attached to the ward, should overlook it by a window. But wherever it is possible each nurse should have her own sleeping-room, away from the ward, into which she should go only when off duty—never leaving the ward at other times. The efficiency of the nurse is so important for her charge, that her health and comfort should be considered for this reason as well as for her own sake.[1]

A small examining-room should be provided for each ward, especially for women's wards. A strong, long table of the right height, with a thin mattress or cushion, would be needed, and facilities for hand-washing; and a bed, perhaps, on which a patient could rest until the effects of anæsthetics pass off. Such a room could serve as the reception-room for new patients on admission to the ward, and for

[1] The Connecticut Training School for Nurses has just completed an excellent three-story brick building as a nurses' dormitory, on the grounds of the General Hospital, New Haven. It cost a little over $12,000, accommodates thirty persons, and is a model of its kind. The Massachusetts General Hospital has also a fine new building for its fifty or more women nurses, and so has Bellevue.

minor operations where the large operating-room is at a distance, or where there is no medical school and no general amphitheatre.

Foul linen shoots in a hospital are non-essential—they are worse. All such linen shoots and dust-shafts are channels for foul air from one floor to another, as well as for flames in case of fire. Foul shoots should never be permitted in building new hospitals. Where shoots are in use already, visitors must notice if they are lined throughout with glazed tiles or hard-faced brick; if they are carried up through the roof like chimneys and left open at the top, as they should be, with a suitable hood to keep out rain and snow. They should open below in the open air, and if possible on the sunny side of the building; and there should be a row of augur holes or blind slats along the bottom of the lowest door to help a continuous upward current of air. The shoots should be cleansed at regular intervals by sending strong sulphur fumes through them and by white-washing. Fresh air is the best every-day disinfectant. The plan of driving away one stench by means of another ought to go out of fashion. It cannot be too distinctly understood that *cleanliness*, *ventilation*, and *dryness* are the proper deodorizers, and that artificial deodorizers will no more take their place than perfumes will serve in the place of soap and water.[1] Examine the dust and linen shoots often at both ends; smell up and down them; and do the same with dumb-waiters. See that the openings for dumb-waiters, and for all

[1] Mr. John Simon.

lifts large enough to admit a person, are protected by a fixed bar, waist-high, to prevent accidents.

On no account ever tolerate the sending of soiled linen down in a dumb-waiter used for food. See that the soiled linen is not kept in the ward, or allowed to accumulate in lobbies, bath-rooms, or closets attached to the ward. It should be put at once, with no more shaking and handling than is absolutely necessary, into tight-covered vessels and sent to the laundry. It would even be better to put soiled clothes into stout bags, and tumble them out of the window into the yard, than allow them to lie about the wards.

Steam-closets for "airing" mattresses and drying sheets are often attached to the wards, in large city hospitals, where steam machinery is used for heating,—an unnecessary and undesirable arrangement; such closets are much better omitted. Only clean mattresses and clean linen damp from the wash should be thus dried, *never* soiled articles.

Visitors must see that dirty towels, wet umbrellas, muddy boots, apple skins, dead flowers, old poultices, and oiled rags are not stuffed out of sight into hot closets with a full head of steam turned on.

Refuse-cans and bins.—See that poultices, old plasters and dressings are *never* thrown down shoots or into water-closets or sinks, but put into the ward refuse-cans and burned up at once. Galvanized iron pails with handles and tight covers should be provided for this purpose. Notice where these cans stand during the day and night, and ask who is responsible for emptying them. Find out

how often they are emptied, and how and where such offensive matter is burned. Burning in the stove or furnace or any ordinary fire must never be attempted. The boiler-house fire is sometimes used in right states of the wind, when the building is a detached one with its own chimney; but every hospital needs a covered pit constructed for such purposes on the grounds outside. The history of epidemics shows what is the risk of burning infected bedding and other articles in the open air.

Open and examine at every visit the refuse-cans and the bins into which sweepings are thrown. Constantly recurring cases of erysipelas and pyæmia in two beds on each side of a particular window of Middlesex Hospital, London, led to a search for the local cause. It was found in a dust-bin in the area below in the direct line of the window. This was cleaned out and left unused, and erysipelas and pyæmia disappeared from those two beds, to reappear after two or three years when the dust-bin, under a new officer, was again in use.

Post-mortem rooms.—Important points for visitors to notice are the position and the general arrangements of the post-mortem building, and of the rooms devoted to out-patients, where there are such. The ventilation and thorough periodic cleansing of all these places are indispensable.

"The frequent nearness of the dead-house, and the practice of allowing [or *requiring*] house-surgeons to conduct the autopsies, is undoubtedly a frequent and unsuspected cause of the propagation of disease. Yet who can be surprised at wounds becoming infected when they are dressed by the

very hands which have recently conducted a post-mortem, or been immersed in the fluids of a body dead, perhaps, of infectious disease? The practice of allowing the same officer to discharge at the same time duties which are so antagonistic in a sanitary point of view as those in the ward, the operating-theatre, and the dead-house is most reprehensible."[1] The utmost care in the change of clothing, in bathing the person, and washing the hands with carbolized water are hardly sufficient precautions. The hair, beard, and finger-nails often carry contagion.

No covered corridor should connect the dead-house with the main building; at least one hundred feet of open space should intervene, and it should be in the direction away from the prevailing wind. The post-mortem building should have its own special arrangements for ventilation and its own system of drains, with sewer connections distinct from those of the hospital.

In many respects a large hospital can be managed more safely than a small one. Subdivision of duties is a protection. The necessity which compels one surgeon or one attendant to do a variety of work involves risk. It is unwise and dangerous to call in a nurse while on duty in the wards to assist at or do the after-work of an autopsy.

[1] Erichsen.

VI.

The Hospital Laundry.

A hospital laundry, with its adjuncts, the disinfecting chamber and the linen-room, represents an essential portion of hospital service. The mode of its management will affect, for good or evil, the general sanitary condition of the institution, and sometimes determine the question of life or death in individual cases.

The needs of the laundry service are so easily foreseen, and the dangers which its various processes involve are so easily calculated, that in pre-arranging matters no point need be left for conjecture. The laundry should be taken into account in the original plan of a new hospital. It must be in a detached and ventilated building, never in, or if possible near, a hospital. Cooking must be done on the premises, and a kitchen must be tolerated, provided it is well ventilated and is not under a ward. Cooking smells are not always unwholesome; laundry vapors are always so. Heat and moisture charged with organic filth, and allowed to pour up into sick and surgical wards, make as uncivilized an exhibition as can well be found. Visitors to country or town hospitals need not envy the steam-laundry, and steam drying-rooms found sometimes under the

ward windows of city institutions. Hand labor, grass bleaching, wind and sunshine are the best dependence for disinfecting and drying hospital linen. No other method will so thoroughly remove ordinary taints.

An outside, airy drying-yard is a necessity; use being made of an in-door drying-room only in prolonged wet or freezing weather. Where grounds are not ample enough to provide for out-door drying, as they seldom are within city limits, hospitals should make special arrangements for a country laundry to which the soiled linen could be daily sent. The work, in such case, ought always to be kept under the control of the hospital authorities and should be supervised by a skilled woman.

Women's supervision.—The medical Director-General of the army hospitals of Berlin during the Franco-Prussian war, devotes several pages of an official report to setting forth the advantages of ladies' supervision over laundry and kitchen affairs in hospitals, and illustrates the point by saying that the quick eye of a lady visitor, on one occasion in one of the Berlin hospitals, detected by its edge that a soiled bandage had not been washed but only ironed; a detail which the government inspector declared his inability to decide. The inability, we venture to say, would be shared, in a similar case, by most of the gentlemen managers, who make their hasty, perfunctory tours of inspection through our city hospitals. In the experience of the writer a hospital laundry was reported untidy by the inspecting committee of gentlemen, because "a tub

of dark-looking liquid " was standing in one corner. They had never seen indigo water.

Infection.—It would be acknowledged as an immense relief, in private families, if the washing-day nuisance could be got rid of. To some extent this is accomplished in England for the working-classes by the establishment of public wash-houses, where, for threepence an hour, a woman may have the use of tubs and hot water and drying-room for her week's wash, and thus keep her little home free from this source of befouling and danger. In private houses the limitations of domestic architecture, as a rule, put the kitchen and laundry together, with a result which has been forcibly described: "These rooms are not only one and the same, often, but they are so constructed and placed on the ground-floor that they communicate more or less directly with all other parts of the house. What is the consequence? The house is filled with the rising vapors of foul steam. The waste from cooking in its conversion to steam carries with it volatile portions of the food; finely divided animal and vegetable matter in a state to take on putrefaction or fermentation, whenever the conditions of warmth and moisture are favorable. The body- and bed-linen of the family are saturated with the excretions of the skin. These excretions consist of the waste products of the body which have accumulated for a week perhaps. A part of the process of washing is the boiling of dirty clothes. A temperature at the boiling point will volatilize most of the excretions in the clothes and enable them to escape with the

vapor, and these, sent off with violence, are driven into all parts of the kitchen and dining-room and penetrate frequently sitting- and sleeping-rooms. They lodge on the meats, bread, and vegetables, adhere to tables, table-linen, plates, knives, and other furniture, to walls, bed-clothes, and carpets. Nor does this accumulation of putrefactive animal and organic waste from cooking and washing remain in its place of lodgment as inert matter. It forms a hot-bed in which germinate vast numbers of low organisms. Rub your hand over some neglected laundry wall; how begrimed it is, what a putrid odor!" [1]

Much of this family nuisance may be abated by the intelligent supervision of the head of the household, by care in cleansing and ventilation, and by the judicious use of whitewash and disinfectants. But if, now, we increase the size of the household until it reaches the numbers of one of our large hospitals, and then remember that it is a household of *sick* people, some of them ill with suppurative and offensive diseases, we can better understand the risks of the laundry service, the wisdom of isolating the laundry, and the need of skilled oversight. Let visiting committees bear in mind, and we cannot too strongly enforce it, that over and above the best plan of construction and the most approved apparatus something more is needed to preserve a house or a hospital from contamination by the excreta of the inmates. As Dr. Smith well says: "The best machinery cannot be automatic; the most

[1] Dr. Stephen Smith.

inefficient can be made useful by intelligent care." One is almost tempted to adapt the familiar couplet and say; for modes of hospital construction

> "let fools contest;
> That which is best administered is best."

Position.—The worst possible position for a hospital laundry is in the basement. The bad air, helped by the constant heat, rises and pervades the building, either through the ordinary channels of *lifts* and staircases, or puffing out and in through the windows. If visiting committees find this department arranged inside a hospital, and nothing better can be done, they must advise its removal to the top floor, where the clothes can be dried on the roof, and the foul vapors more rapidly carried away and diluted with the fresh upper air. It is better to provide the extra apparatus and pay for extra labor of pumping and hoisting than run the risk of filling the wards with the fumes which any basement laundry, no matter how well conducted, must generate. "Why do you always smell of dirty dish towels here?" asked a visitor, with a keen, fresh olfactory sense brought from the country, as he mounted the marble vestibule steps of one of the finest hospitals in New York. It was the unrecognized abiding atmosphere of the halls to which he gave this name.

Wherever the laundry is put it should have its own ventilating chimney with a strong draught and its own direct drain-pipes and main sewer connections and traps. The sudden letting off of a tubful

of laundry slops will suck out the ordinary traps of water-closets and basins in the same stack and make way for an instantaneous rush of pernicious vapor.

The ventilation and drainage of a hospital laundry should be carefully studied and made thorough and complete, so that no damp, bad air need hang about the place, and no foul water stand in any pipe or trap. The floor should be drained to keep it dry, and the utmost care and cleanliness should be observed with the tubs and all utensils. Necessary repairs should be promptly made. The work of the laundry-women is particularly severe, and exposes them often to infection. Whatever humane precaution is needed to protect their health should be used. Fever epidemics sometimes occur among washerwomen in poorly arranged laundries; and felons, cases of inflammation of the eyes, and erysipelas are not infrequent. The laundry building should be reserved for laundry and disinfecting work only. It is a violation of sanitary principles to put bedrooms for employees in or over a laundry.

The size of a hospital laundry will depend much upon the mode in which the work is done, whether by machinery or not. For fifty beds, and for work done chiefly by manual labor, a one-story building, thirty by thirty feet, would probably be sufficient. For a hospital of one hundred patients a one-story building, forty by forty feet, might be required.[1] This would give a capacity of four large rooms, each twenty feet square, giving space for disinfecting chamber, separate sorting-room, in-door drying-room,

[1] Mr. Carl Pfeiffer, Architect.

and other purposes. The same size would answer for double or triple the number of beds if steam machinery were used—the furnace and boiler being in a basement. Two or three large rooms are better than several small ones. They can be more easily aired and supervised. Where there is much ironing to be done, enough space for the ironing-boards or tables should be calculated for; it is these which take up room.

Working capacity.—But size in these matters is of less importance than convenient arrangement of details and good system in management. An inquiry into the working capacity of some of the city laundries for family washing shows that a great amount of work can be done in less space, with simpler methods, and with less consumption of fuel than is commonly supposed. In one of these establishments, very clean and evidently systematically managed, occupying one floor of an ordinary house, the writer found the work going on with eight women, in a room about fifteen by thirty feet altogether, leaving plenty of vacant space in front for office business. There were six tubs for hand-washing and rinsing, and a small round stove which held the water coil and supplied hot water; a ten-gallon clothes-boiler could stand on top. The consumption of fuel was two bushels, or four scuttles, of coal daily. A drying-room was partitioned off by planking, sheathed, low ceiling and all, with sheet tin, and here a very small stove dried the clothes on a reel and kept relays of irons hot. On an average this laundry washed and ironed daily, by hand labor,

about one hundred starched shirts, collars, and other pieces. The proprietor said that with bed-linen and towels, needing no starching, he could turn out a thousand pieces daily, or nearly as many in a day as the weekly wash for a hospital of fifty beds. This was washing for well people. The character of hospital washing would make special apparatus for disinfection necessary, and therefore require a different disposition of space and, except for small hospitals, probably more time and more room. Some one space or room should be strictly reserved in connection with a hospital laundry in which to receive and disinfect foul clothing and bandages. But granting that the proprietor may have somewhat overestimated the capacity of his little stove for furnishing enough hot water rapidly, it is evident that any hospital having available labor, and ground-space on which to put up some simple frame building, need never wait to complete a large and costly structure with elaborate steam appliances, in order to provide itself with an outside laundry and with that essential of all properly-managed hospitals, an ample and never-ceasing supply of clean, fresh-washed linen.

There has never been a machine invented equal in its operation in cleansing clothes to the thorough, old-fashioned hand-washing; but in large hospitals hand-washing exclusively is out of the question; a good washing-machine turned by hand or power is required. Where there is steam-power the use of steam machinery will be a saving of three fourths of the time and labor. Two steam-washers will do the

work of the largest hospital. A rough estimate puts the amount of washing for fifty beds, and for the necessary officers and attendants, at from one thousand to fifteen hundred pieces weekly.

The statistics of the laundry service in several of the large hospitals of New York and of one or two elsewhere, for an average week at a certain date, are given, by permission, for the purpose of showing accurately the amount of washing, in well-managed hospitals, as compared with the number of beds. The number of hands employed will differ with the character of the machinery in use, and other circumstances.

ROOSEVELT HOSPITAL, NEW YORK.

Average number of patients at date of inquiry	.	143
Officers and attendants	.	58
Ward wash, general	pieces	1,226
" personal	"	127
Officers' and attendants' wash, general	"	456
" " " personal	"	617
Miscellaneous wash : dead-house and engine-room towels	"	62
Total number of pieces in one week	.	2,488

Steam machinery is used. A head laundress with three assistants, and a boy at five dollars a month, are employed. Many patients prefer to have their personal washing done at home, which accounts for the small number of ward body-garments.

PRESBYTERIAN HOSPITAL, NEW YORK.

Average number of patients at date of inquiry	.	65
Officers and attendants	.	43
Ward wash, general	pieces	816
" personal	"	217
Officers' and attendants' wash, general	"	314
" " " personal	"	440
Miscellaneous	"	40
Total number of pieces in one week	.	1,827

Four women are employed for the laundry service. Steam-power is used, and drives the mangle, wringer, etc.

WOMAN'S HOSPITAL, NEW YORK.

Average number of patients at date of inquiry	.	100
Officers and nurses	.	27
Pieces of body-clothing for patients	.	500
" " " officers and nurses	.	200
Bed- and table-linen, and towels for all	.	1,226
Total number of pieces in one week	.	1,926

One head laundress who sorts and delivers the clothes, and six women, are employed. Two of the women tend the washing-machines and the mangle; two wash the starched or body-clothing, and at the end of the week assist the two ironers. Servants' wash is not included in the figures given above. The machines are run by steam-power.

STATE HOSPITAL, NEW HAVEN, CONN.

Average number of patients at date of inquiry	.	73
Officers and attendants	.	40
Ward washing	pieces,	1,561
Officers' and attendants' washing	"	664
Total number of pieces in one week	.	2,225

The laundry is a brick building outside the hospital. One large empty room where clothes-lines can be stretched, is circled by steam-pipes for drying clothes quickly in wet weather. The drying is done out-of-doors whenever possible. There is a "hot box" or chest into which steam is turned for disinfecting, but no other steam machinery is used. A washing-machine for very soiled clothing is turned by hand. Slate tubs with hand labor are used for all other washing. A head laundress, two women, and a man for the heavy work, are employed.

MARY FLETCHER HOSPITAL, BURLINGTON, VERMONT.

Average number of household, patients and officers included, at date of inquiry	33
Number of pieces in wash, weekly	600

This laundry in its simple arrangements furnishes a good model for small institutions. An old frame building found on the premises was moved to a distance of one hundred feet from the wards, and adapted to its purpose. It has two rooms, a wash-

ing-room and a drying-room, each about thirty feet square, larger than necessary in putting up a new building. The washing-room is fitted with stationary stone tubs, supplied with hot and cold water from faucets, and communicating with the drain. It has, close to the tubs, a large copper boiler built into brickwork, with fire below, and receiving its water from a tank in the main hospital building. The drying-room, used only in bad weather, has opposite windows affording currents of fresh air. In ordinary weather clothes are dried on reels in the open air. Half a ton of coal weekly is consumed in the laundry stoves for heating water and all other purposes. Two women are constantly employed at hand labor exclusively.

Apparatus.—So many improvements and inventions are being made that no special machinery can be mentioned. A laundry must be fitted up with the best attainable apparatus of whatever may be the most approved patent. One test of a good washing-machine is the little amount of lint that will hang about it. Where the washers are worked by steam this power will also serve to run a steam-wringer and mangle. Steam-wringers are cylindrical vats revolving with great velocity, and throwing off the water by centrifugal force. Four hundred revolutions a minute will suffice to wring the clothes so thoroughly that they will dry in seven minutes in a steam-heated drying-room. Such drying-rooms are fitted with sliding wooden drying-frames or horses, and are heated from below by coils of hot pipe. The space required is not

large; ten feet by fifteen, with a ceiling not more than eight or nine feet high, is ample size for such a room in a hospital of two hundred beds. The walls may be sheathed with zinc. If the washing is thoroughly done this mode of steam-drying would be less objectionable, but in any case such a drying-room requires frequent disinfection (which may be effected by burning roll sulphur) and constant ventilation by flues which will carry the damp vapor to a safe distance. In suburban hospitals a large vacant laundry room, where ropes can be stretched, should be reserved for drying clothes in bad weather.

A steam-vat for *boiling* clothes or a large copper clothes-boiler set in brick, with fire below or at the side, giving space also for heating flat-irons, will be needed. Where the ironing-room is a separate one, a small coal- or gas-stove for the irons should stand in a brick-walled alcove. This is a precaution against fire, and in summer it keeps the ironing-room cooler. A soaking-tank, rinsing-tubs, a copper starch-kettle; all these must be provided. The best wash-tubs for hand-washing are slatė. With porcelain tubs for rough work, the least crack or chip or imperfection in glazing will permit the absorption of foul matter. Two or more tubs should be reserved for the washing of the household apart from that of the wards and on different days.

Soap-making. — Among the laundry fixtures should be a large kettle for soap-boiling, for where the meat diet is of good quality the waste

fat of the hospital kitchen can be economized in this way and made to serve most cleansing purposes. In a carefully managed hospital of one hundred inmates, known to the writer, the fat saved and rendered served the uses of the kitchen, made oil for the machinery, and all the soap, both hard and soft, required by the household, except soap for surgical use; while the sale of the surplus fat averaged enough to pay for the potash purchased for the manufacture.

Disinfecting-room.—The room strictly set apart in the laundry for sorting and disinfecting foul and infected articles, should be a light and particularly well-ventilated room. It should have a copper vat specially reserved for boiling such articles. This may be a steam-vat, if the machinery is run by steam, or a large, tight-covered copper kettle with fire beneath, like, but distinct from, the boiler used for the ordinary washing. The service also requires a metal soaking-vat for foul bandages and cloths which need careful disinfection, but which must not be mixed with articles from poison cases. For complete outfit, there must be a heavy wooden metal-lined chest, or a chest with double walls of sheet metal and some material which is a poor conductor of heat between them. This must have a steam-gauge and thermometer, and an outlet, with valve, into the boiler-house chimney. In this box an entire mattress, or pillows, or parcels of cloth clothing can be baked by dry heat, from steam-coils arranged in the bottom of the box, or by live steam charged with disinfectants and driven through. Superheated

steam has been found a valuable purifying agent. In several hospitals of Berlin, and other parts of Germany, such recently patented apparatus is now used for disinfection by heat, both moist and dry, the arrangement being similar to our own. A frame with crossbars, on which clothing may hang, is run in, by an upper door of the chest, and another frame, or wagon, run in below, carries the coils of copper tubes, one set perforated, one close, which are connected with the outside heating-pipes and used alternately. In large hospitals, a bricked closet or oven for use in baking or fumigating, into which a single iron bedstead with all its bedding can be run, is required rather than a box.

Mattress-making.—A shed or room remote from the wards, in which straw beds may be emptied and filled, or hair mattresses, if these are used, may be picked over and re-made, is a necessity for every hospital. It is work which is always going on and which constantly involves risk of infection and for which, therefore, some special room must be reserved. This room, though distinct from the laundry, may very well be built over or in connection with it. There are hair-picking machines run by power, which facilitate the work where it is best to economize labor, but they are apt to break the hair and waste it, and hand-picking, though slower, is more thorough.

Linen-room.—The room for the storage of the clean linen of a hospital should be near the matron's or house-keeper's quarters, well ventilated and lighted, and, if possible, constructed with an ex-

posure to the sun. Like the laundry, it should be under the general charge of the matron, who, in a large hospital, should have a special assistant as linen-room woman to superintend and sort and mend the clean linen when it comes from the wash.

Open-slatted shelves for the linen, round which the sun and air can have free play, should be provided. French hospitals furnish good models. Glass doors for the shelving are neat but troublesome and unnecessary. Any space left below the shelves may be fitted with drawers for bundles of old linen and flannel and articles too much worn for their original use, but which can be made to serve some purpose. All drawers and shelves should be labelled distinctly, so that any article needed in haste can be found without difficulty. A good sewing-machine is part of a complete outfit, and a large table on which articles can be spread, examined, and folded. A room, or loft, apart from the linen-room proper, is needed, furnished with wide racks, where mattresses and pillows may be kept and aired when not in use. There should be a constant current of air drawing through, and the windows should be left open, day and night, in dry weather.

A book with a lettered index, is required in the linen-room in which to keep a full account of all bed-, body-, and table-linen, and all the property of the hospital connected with the laundry and linen-room. When articles are worn out they should be credited, and when new supplies are purchased they should be charged to the account. Donations of

goods or clothing made to the hospital, should also be accurately recorded. In this way, when an inventory is taken, a balance can easily be struck. This systematic way of keeping lists enables a new occupant of a position to learn at a glance on taking charge just what property owned by the hospital comes under her care. This book is written up by the matron, and with its aid she should be able, at any time, to give a satisfactory and business-like statement to the managers or other inspecting officers. This book may be called the linen-room ledger.

For complete system there should be a day-book kept by the linen-room woman, in which are charged all articles issued to nurses or other employees, and in which signed receipts are entered as vouchers. When a general account is taken, the linen-room woman must see that all the articles are accounted for—either as issued to the wards, remaining in stock, or in the wash. When this is done she can countersign the record. If articles are used up or are missing on a given date, the discrepancy is to be noted accurately in the ledger. Matron, linen-room woman, chief laundry-woman, and nurses ought to compare and settle the linen-accounts once a month at least.

For recording the soiled linen taken from the wards to the laundry, printed slips are needed to be sent with the bundles. They should have a blank for date, for the number of the ward, and for the name of the nurse who sends, and of the chief laundry-woman who receives the parcels. Printed labels marked DISINFECT and POISON, are also

needed. The apothecary can furnish the linen-room with common, printed poison labels which answer this use.

A few simple printed forms and rules will save labor and systematize the work of a hospital laundry very much. Rules and directions plainly printed on cards and hung in the laundry will be found useful—*How to make soap; How to wash woollens; How to disinfect.* Printed rules as to the number and character of pieces allowed in the wash for patients and attendants, should be posted in the proper places. Neatly and legibly printed cards which can be tacked up conspicuously carry authority and furnish a reminder when verbal instructions might be overlooked. The ledger, day-book, printed slips and forms are among the first requirements of the linen department.

Much of the hospital linen will be in constant use, coming and going. Each ward, in its own linen-closet, or in the closet of the nurse's room and under her care, should have a day's supply in advance, but no more. Articles sent to the wash from the wards should not be returned clean to the nurses directly; they must be sent from the laundry to the linen-room for distribution, and at a fixed and convenient hour every day the nurses must come to the linen-room, make their requisitions, and receive their ward supplies. The linen-room woman must keep a marking-pad and see that the linen is always neatly and clearly stamped with the proper hospital or ward mark.

Outfit.—A memorandum is given in the appendix

among ward outfit, of the articles needed in stocking a linen-room. It is the best economy to choose good, stout material for hospital wear, and to make and keep the supply of all articles ample. It should be so ample that beds and patients can be kept perfectly clean without risk of using damp linen. Dark-colored quilts and blankets are to be avoided. That they "do not show dirt," is by no means a virtue—it is a serious objection. Draw-sheets should be supplied of yard-wide cotton, and three yards long. They are folded and used double. Tapes at the edges to tie them tight to the bedstead are useful. Besides rubber sheets and rubber pillow-cases, a roll of stout, tarred paper (or some similar cheap material, such as oiled muslin) must be kept in stock. It is wanted for use under certain foul cases, or with lying-in cases, instead of a rubber sheet, and is then burnt up. It is useful, also, to wrap infected cloths and dressings in, so that the parcels may be burnt without opening. Shirts, night-gowns, and wrappers are needed, but a hospital must generally depend upon outside charity to provide most of these articles of body-clothing. Bandage-muslin is usually a dispensary supply, but the matron can prevent waste by taking charge of it herself and issuing it from the linen-room. Where the outfit is complete, and the house-keeper's supervision is what it should be, there will be less waste and misuse.

The laundry service.—The immediate charge of a hospital laundry should be in the hands of a competent head laundress. The matron or house-keeper should be empowered to employ such a

woman, and to employ and pay for all necessary assistants. The matron should be held accountable by the managers, and in turn should hold her head laundry-woman accountable for the way in which the work is done and for the proper and careful use of all the fixtures.

Laundry work properly begins at the moment when the clothing for beds or patients is changed in the wards, and properly divides itself in the following way:

1. Duties of the nurse.
2. Duties of the head laundress.
3. Duties of the laundry-maids.
4. Duties of the linen-room woman.
5. Duties of the matron.

The suggestions which are given are of a practical sort, and, for the sake of simplicity, are directly addressed to hospital employees. Visitors should observe all the stages of the work. Let them follow a garment from the ward to the laundry, and back to the linen-room, and notice how perfectly or imperfectly the system here enjoined is carried out.

1. **Duties of the nurse.**—When bed- or body-clothing is to be changed, all the clean articles must be near at hand before a nurse begins to remove the soiled ones. Make the change as quickly as possible, and take the soiled clothing of each case out of the ward *at once*. Never leave an accumulating pile of soiled clothes in the ward until the last bed and patient have been put in order; an hour or two

might pass before this work was ended, and the soiled clothing would infect the air all this time.

As soon as each parcel is taken out of the ward, it must be put by the nurse or some trustworthy assistant, with as little handling and shaking as need be, into a tight-covered metal can or zinc-lined box for removal *at once* to the laundry.

In ordinary surgical cases all bandages, towels, and cloths used for the patient must be put by themselves in a package and marked with a printed label: DISINFECT.

All bandages or cloths used for wounds where there is excessive suppuration, must be tossed into a galvanized iron refuse-pail *covered tightly*, or stoneware jar *covered*, and as soon as the dressings are over must be carried out of the ward and burned; or they may be tightly wrapped in tarred paper and burned, wrapper and all. The pail or jar should contain chloride of lime or strong disinfecting fluid enough to soak or cover the contents. The burning must be done outside the buildings, in the pit specially provided; or, where there is an outside boiler-house, with its own chimney, the boiler fire may be used for this purpose. This business the matron or the engineer, where there is one, will superintend. It is the nurse's part to send the offensive material promptly out of the ward, and to see that it is delivered to the proper officer. *No refuse-pail used for the above purpose is ever to be allowed to stand in the ward, or bath-rooms, or closets, or to be sent up and down on a dumb-waiter.* It must

be carried out immediately, emptied, and rinsed with disinfectant, and then kept exposed to the open air, until the next dressing-hour.

Bandages, cloths, and dressings from patients with erysipelas, pyæmia, gangrene, cancer, puerperal fever, or any communicable or infectious disease, must be put in a *special* pail containing disinfectants, *not in the pail which is in daily use*, or they may be tightly rolled in a sheet of tarred paper. They must be sent away at once, burned in the right place, and by the proper officer.

Doctors' operating aprons, and hand towels, and all patients' bedding, and body-clothing, used for these dangerous cases, which can be washed and are too valuable to be destroyed, must be put at once into a vessel containing sulphate-of-zinc solution, marked POISON, and sent to the laundry with a list. The articles picked out to be used for such cases, should themselves as far as possible be marked in advance in such a way that they may be identified and used only for the same patient again and then destroyed.

Cloth clothing, hats, boots, and other articles which cannot be washed, and which have been in contact with erysipelas or other communicable disease, must be rolled in a tarred sheet or similar wrap, marked POISON, and sent at once to the laundry with a list. Blankets, mattresses, and pillows from such cases are to be treated in the same way.

In the case of a new patient in the ward, the nurse will see that his cloth clothing when removed

is made into a bundle and sent to the laundry to be cleansed, aired, and returned, and that his soiled underclothing is marked and sent to be washed.

When clothing must wait until there is time to count it and make out lists, it should be kept in a closet or room provided for the purpose, with an open window, and used for nothing else. But soiled things should reach the laundry as promptly as possible—certainly within an hour from the time of the morning changing. Never, on any account, should they remain over-night away from the laundry. Covered cans or metal-lined boxes are better for taking away the clothes than baskets, in the interstices of which impurities gradually collect. If the hospital is not furnished with suitable utensils of this character, visitors must urge their provision. Stout linen bags and rubber sheets, for wrapping bundles tightly, can be used meanwhile. If an attendant can follow the nurse in her rounds of the ward, and collect the soiled clothes and keep count as she carries them out, it will save labor and handling, and will quicken the process of getting them to the laundry. Two washing lists should be made, dated and signed, on printed slips furnished from the linen-room, one to be sent to the laundry and the duplicate to be kept by the nurse for use on the return of her clothing from the linen-room.

2. **Duties of the head laundress.**—When the soiled clothes are not brought (as they should be) directly to the laundry, the head laundress, promptly each morning and afternoon, at hours agreed on beforehand with the nurse, sends her assistants to

collect and bring the bundles to the sorting-room of the laundry.

She first of all attends to any bundles marked POISON or DISINFECT. Those marked POISON contain bedding and body-clothing from infectious and therefore dangerous cases. Those articles which can be washed, she tosses, rolled up as they are, immediately on their arrival in the laundry, into a tight metal disinfecting vat, where they should soak in a boiling-hot solution made in the following proportions: To each gallon of hot water add four ounces of sulphate of zinc and two ounces of common salt well dissolved and mixed. While under this fluid the bundles must be stirred and poked open and must boil for an hour. They may then be boiled in clear water with plenty of soft soap and washed in the usual way afterward.

The bundles marked DISINFECT contain bandages, towels, and cloths used for ordinary surgical cases; they have not been used for communicable or extra hazardous diseases, and must not be mixed with articles marked POISON. They, however, require careful disinfection, and must be put into a metal vat, strictly kept for the purpose, a large tin boiler, for example, in a hot solution, of the same strength as before, of sulphate of zinc and salt. If the apothecary prepares the solutions for laundry use he must mark the proportions legibly on each bottle. The bandages or clothing put into this disinfecting fluid must be stirred occasionally and left in soak for six or more hours. They can then be boiled in clean water, rubbed and washed in the usual way.

Washed bandages should be sent unrolled, but smoothly stretched, to the linen-room. As these bundles are none of them to be handled before they are cleansed, they must be carefully compared with the lists sent from the wards, when they are ready to go to the linen-room. There must be enough fluid thoroughly to cover the articles in soak, and it must be thrown away after one using. *No disinfecting solution is to be used a second time.*

All unwashable articles marked POISON are to be put into the disinfecting chest or box described among the laundry fixtures, made hot and kept in dry heat for eight hours; or they should be fumigated, or steamed with live steam combined with disinfectants whenever practicable, and according to the special laundry apparatus provided. They should be afterward thoroughly sunned and aired.

Mattresses and pillows which reach the laundry marked POISON are to be baked or steamed, one by one, in the same way, first, in order to make it safe to handle them, and then ripped up, the hair and feathers steamed and aired, the covers washed and the articles re-made. Blankets marked POISON, if not destroyed, should be dry-baked eight hours at least, and then washed by themselves as flannels are. Boiling or steaming them would ruin them. The laundress must be thorough in all such work, recognizing the fact that the lives of patients may depend on her.

The ordinary packages of linen and clothing the head laundress opens and counts, comparing them with the lists sent, sorting them in heaps, and re-

counting where there is any discrepancy. It is not necessary in washing ordinary articles to keep all those belonging to one ward by themselves. Hospital property should all have been marked or stamped indelibly with the ward numbers beforehand, and pieces can thus easily be sorted when clean. But all articles of a kind should be washed by themselves: bedding in one lot, body-clothing in another; towels alone, flannels always by themselves.

Having sorted and counted the articles, the head laundry-woman will see that the cotton and linen pieces are put to soak as quickly as possible in hot water; soap is not usually necessary for this. She will then give out the required quantity of blueing and of soap, which should be of hospital manufacture; and she will see that she has the necessaries for disinfecting uses on hand. Her further duties are in directing the work of her assistants and in ironing, folding, and counting.

The clothing being all ironed or mangled neatly, the head laundress sorts it for the linen-room, according to the ward marks; or if no marks are used, according to the numbers of each article noted on the list sent by the ward nurses. This sorting and counting is necessary as a check upon the laundry-maids, for whom the chief laundry-woman is responsible. No matter how ragged and worn the articles are they are to be returned as they came. They are made up into piles with the ward lists attached, and carried to the linen-room.

The head laundress then sees that her tubs are thoroughly scrubbed, her laundry clean, baskets,

ironing blankets, irons, iron-holders, clothes-pins and lines collected, and the windows thrown open awhile, that all may be ready and fresh for the next day. The laundry windows should always be kept lowered an inch at the top during the day in suitable weather, and a ventilating pane of glass in each of them be left open at night. The work for the day being ended, the door is locked and the head laundress keeps the key.

3. **Duties of the laundry-maids.**—The laundry-maids having put all their wash to soak in very hot water, will next take the articles, a few at a time, washing each article as taken from the soaking tubs in hot soapsuds, using soap freely, but not allowing it to waste in the water. The water in the washing-tubs must be *changed frequently*, and only a few pieces taken from the soaking-tub at a time.

The clothing when washed in this way is now partially wrung out and put over the fire or in the proper steam-vat to boil. Hospital clothes *always* require boiling in soapsuds. When there are no arrangements in the laundry for boiling the clothes they must be put, after a thorough washing in hot water and soap, into clean, hot soapsuds to soak for two hours.

When boiled or soaked, dip the clothes out into clean, hot water with a little blueing in it, changing the water as often as it becomes soapy. Finally, pass the clothes through the wringer into baskets, and hang them in the open air to dry.

When the clothes are almost dry take them from the lines, shake and roll them for ironing. It is un-

necessary to allow clothes to dry and then to dampen them again; it is a waste of labor. In a hospital all the processes of washing and ironing are going on all the time, and there need be no delay. Iron with hot, clean irons and make every thing perfectly smooth. There should be no hospital clothes which require starch.

The washing for the medical staff, house-keeper, nurses, and others should always be done by itself on a day set apart, and in special tubs reserved for this purpose; and the bundles from the wards which accumulate during this time should be put to soak, or stored in a *ventilated* closet in the laundry until later in the day when they can be attended to. But any packages from the wards marked DISINFECT or POISON cannot wait; these must *at once* be put into the vats with the boiling-hot disinfectants and covered over. Bundles sent from the wards late in the afternoon should be counted, sorted, and put to soak over-night.

4. **Duties of the linen-room woman.**—The clothing and bedding for each ward as they come in to the linen-room from the wash are looked over. All articles too much torn and defaced to be used again are replaced by whole ones, and those which can be mended are kept patched and renewed by taking the best parts of discarded articles for this purpose: stockings being re-footed from the unworn portions of older pairs; sheets and other articles too far gone for their legitimate use being torn into strips for bandages, or kept to be used as large pieces, or made into small squares for poultice-cloths. Old pieces

of bed-ticking not needed for patches can be used for floor-cloths in kitchens and entries. One division of the linen-room, or part of its shelves and drawers, should be kept for all these very necessary articles. No piece of cotton is so old that it cannot be used in some way in a hospital, and it is far more useful for surgical cases than new cotton would be; even the oldest pieces can be made into pads. Half-worn stockings and gowns can be mended and made suitable for the decent burial of the poor. The matron and linen-room woman will find that there is use for every such garment. Proper burial clothes are rarely provided by the authorities in public hospitals; only one garment of very thin paper cambric is allowed at Bellevue Hospital, for instance, in cases where friends are unable to make provision.

A careful note should be made by the linen-room woman of each article which she condemns, and of the numbers of new articles, or the quantity of new material, monthly, which has been supplied. Where new cloth or clothing is required the linen-room woman makes her requisition upon the housekeeper, and as much of the linen as can be comfortably made up in the house under the direction of the linen-room woman should be so made. Convalescent women patients may now and then be employed in light mending and sewing in the linen-room, if the system is not carried too far and abused. Bandage-rolling may be done either in the linen-room, or in the wards by convalescents, to whom it would be a diversion.

All the clothing being in order, buttons and strings sewed on, and good articles substituted for worn ones, the piles are re-counted and sent to each ward, with any additional articles for which requisition has been made in due form. The nurses receive the parcels, receipt for them, compare them with their lists, and pile the articles neatly on the shelves of the ward linen-closet. It is to be supposed that the nurse of each ward is furnished with a little extra supply of clothing for emergencies, and that she and the linen-room woman have duplicate lists of all such property.

5. **Duties of the matron.**—A house-keeper or matron who understands her business will daily inspect and overhaul the laundry and linen-room, with all their adjuncts; she will constantly make it known that she means to have the work well done; and she will make the doing of it easier by suitable rules. She will take pains to select only women of good character and apparent sound health as laundry employees, and will require her head laundress to enforce good discipline as well as thoroughness in work. She will have a careful oversight of the disinfecting processes, informing herself of the character and uses of various chemicals, and the quantities required in each case; and will personally superintend the more important work of this kind, such as the disinfecting or destroying of mattresses, clothing, and bedding used in erysipelas and other communicable diseases. One of the men attendants *not connected with ward service* should be specially charged with the heavier work of disinfection, acting

in agreement with the head laundress; and the matron of the hospital must see that whoever has the handling of infected articles understands the risk, is free from cuts or wounds, and is otherwise instructed how to protect and cleanse himself. If hair mattresses and pillows are never used for bad cases, but if straw beds and chaff pillows, which can be burned, are substituted, the labor of the laundry people is lightened, hospital property is saved the wear and tear of steaming and disinfecting, and the risk of contagion from such sources is reduced to a minimum. The burning of bandages in exceptionally bad cases of suppurative disease, or of erysipelas, must not be thought extravagant. The danger justifies the precaution. *No washing or disinfecting makes it safe to use them again.*

The matron will issue weekly to the head laundress the quantity of soap, starch, blueing, and disinfectants required, keeping account of the quantities used; and she will take note of the clothes-lines, ironing blankets, and other articles which are on hand, and of the condition of the laundry and all its apparatus. She will daily inspect the piles of clean clothing in the linen-room ready for the wards, and if dissatisfied with the color of articles will return them to the laundry to be rewashed; the linen-room woman keeping a list of articles so returned. The matron must see that all soiled clothes are promptly brought to the laundry from the wards. She must see that the nurses are furnished with poison labels; and must require that these be securely fastened on all bundles needing disinfection.

This she must insist on for the protection of her laundry-women as well as for other reasons.

The matron will require from the linen-room woman a monthly account of stock and losses, and of new articles needed, and will enter it with the requisitions from the head laundress in her linen and laundry ledger for inspection by the authorities of the hospital at any time. She will make no requisitions on the authorities for material or money, without herself going over the monthly statement of condemned articles, and personally inspecting these articles.

The care and cleansing of all the bedding of the institution which is in general use, the washing of the blankets, bed-sacks and pillow-sacks at regular intervals, and remaking mattresses and pillows, is under the matron's charge, and she will call on the laundry for necessary labor.

The body-clothes, cloth clothing, boots, and hats of new patients which are sent by the nurses to the laundry, come under the matron's general care. She must see that such articles are thoroughly washed or cleansed by one of the laundry-women whose business it is made to attend to this. They must be sponged, brushed, aired, and, if need be, steamed or baked *before* being hung up or stowed away in clothes-closets. Verminous clothes should be burned. It is almost impossible to destroy body vermin.

Another special duty which belongs to the matron's province in connection with the laundry service is the oversight of the clothes-shoots, where

these are used. The builders of old-fashioned, many-storied hospitals thought such shoots were a convenience, but they are a certain channel for the return of foul air to the lobbies and wards. The matron must keep a constant sharp eye over the shafts to see that the soiled bundles do not lie too long, but are promptly taken out by the laundress two or three times a day; that soiled clothes are made into secure bundles by the nurses, and are not pitched down loose, catching on sills and roughnesses and hanging until accidentally discovered and poked down, meanwhile spreading foulness all about them; and that the shaft-doors on each floor and at the bottom are kept locked and the keys in charge of a responsible attendant,—this prevents various tricks and abuses. The mouths of the shoots, where the clothes lie, should be scrubbed out at least twice a week, with strong hot soft-soap suds, and once a month the fumes of burnt sulphur must be driven through the shaft. If the lining surface admits it, a monthly whitewashing, after the fumigation, as far as long-handled brushes can reach up and down for each floor, is desirable. Ventilation through and through the shafts, and out by the roof, will prove the best steady, every-day disinfectant.

Apparatus varies so much in different hospitals, that it is not easy to fix the number of laundry-women who should be employed for any given number of beds. In a hospital where the steam machinery is complete, a capable head laundress with two or at most three assistants can do the washing for fifty patients, and their necessary at-

tendants and medical officers; an increase of 100 per cent. in the patients would probably require an addition of 33 per cent. to the laundry labor. The amount of washing necessary for hospital patients cannot be limited in quantity, but it may and should be in kind. For instance, white petticoats, white dresses, frilled and fluted gowns and jackets, and all such articles not fit for hospital use, should be excluded from the hospital laundry. Articles for employees of all grades, from the superintendent's family and the house-keeper down, should be strictly limited both in number and kind, and the limits defined in a set of printed regulations hung up in the laundry and in the common rooms of the officers and attendants.

Paying patients in private rooms should always pay a fixed price for their washing, and should be notified of this on their admission. No fluting, or extra fine washing of any sort should ever be undertaken by a hospital laundry, either for officers or private patients. Washing for nurses should always be done for them. No nurses should be allowed to go to the laundry. Hospital servants may be allowed the use of the laundry at certain fixed times, under careful restrictions; or their washing may be done for them by the laundry-maids at the discretion of the matron. It is better for economy and discipline if all the servants' washing is done for them in the regular way.

All the various duties described in the preceding chapter should be apportioned among the subordinates of the hospital, but the matron or house-

keeper is the officer who is especially responsible to the lady managers, or other authorities, for the well-doing of the work; and she should be constantly vigilant in supervision, keeping a high standard of neatness, thoroughness, and orderly conduct, to which she obliges her servants and assistants to conform.

VII.

HOSPITAL HOUSE-KEEPING.

In the following chapter, the best and most modern hospital methods and apparatus are described for the information of visitors; but simpler conditions and the absence of elaborate apparatus are no excuse for the neglect of either moral or sanitary precautions. The same necessities exist and the same principles apply whether the hospital is a large group of wards and buildings, or one or two rooms in a county house.

Matron's duties.—As the easiest way of showing how a hospital and its household should be managed in those domestic matters which visitors have a right to inquire into and criticise, we give, at the risk of repeating some things already said, a code of directions for a hospital matron,—directions which have been tested by several years of actual practice. In proportion as visitors can assure themselves that all the details mentioned in the following pages are faithfully and regularly attended to, they may rest satisfied that the matron is doing her duty, and that their hospital is well managed, so far as concerns this portion of their "Woman's Kingdom."

Household order.—A hospital matron is responsible in the sight of God for the moral and physical well-being of all her employees, and of all the sick,

so far as any of their interests are under her care. Every hospital has its own rules, laid down by its governing authorities, and these of course must be implicitly followed. There are, however, many details which go to make up the sum of comfort or discomfort in the household, and these will be to a great extent within the discretion of the matron.

Where a corps of attendants is expected to follow the directions of heads of two or three different departments, it is somewhat as if two or three different families lived in one house, with one set of servants on whom they all called at once. Something of this is inevitable in a hospital; but the friction is greatly lessened by frequent and friendly consultation among the heads of departments. The matron plans the work and keeps the run of it, and if directions are given over her head or independently of her the work is thrown into confusion. There need be but little trouble on this point if there are good-will, disposition to accommodate, and, above all, a desire to serve the interests of the hospital first and always, instead of one's own petty dignity. Much, too, may be done by the fixing of regular duties and regular hours for all attendants, and holding them to strict punctuality and obedience to orders.

If A thinks something is B's duty, and B thinks it is A's, neither will do it; not necessarily out of ill-will, but from want of precision on the part of the matron in defining duties and instructions. Or, if there is "a slight coolness" between A and B, as sometimes happens in the best-regulated hospitals,

the work may stand still, and the sick—shame that it should be so—will be the ones to suffer.

Many parts of hospital work must be done hour by hour, day by day, with something of the mechanical reiteration of clock-work. The medicines, the special diet, the clean linen, must come into the ward with the certainty of sunrise. The comfort of a large household of helpless persons cannot be secured in any other way. Every thing must be thought out, planned out, provided for. Nothing must be left at loose ends with the foolish expectation that "somehow" it will come out right. Disciplinary methods of the "happy-go-lucky" sort sometimes earn a cheap and transient popularity with the lower quality of attendants and officers; but it is a mistake to believe that conscientious and intelligent persons like them. These prefer order and system, knowing that their work is made easier by them; and respect those officers most who steadily and yet kindly enforce them.

The matron must of course set the example of punctuality and exactness. "Like mistress, like maid." A household can soon be trained into regularity and precision by the right methods; employees will fall into line out of pride and pleasure in doing their work well, or because of the influence of example, or because they are afraid of losing their places.

Moral atmosphere.—The matron should watch assiduously the moral atmosphere of her household, as well as the air it breathes, and do all in her power to keep *both* clean and pure. She should be careful how and where the employees are lodged; that the

rooms or dormitories are always tidy; are warm enough in cold weather; are well aired (servants' rooms in even some of the best private houses are often reservoirs of foul air for the rest of the house); that the dormitories of the men and women attendants are entirely separate, with separate staircases and approaches, and that there is no coming or going between them. The men should be required in turn to make all their own beds and sweep out their own quarters; no women except the once-a-week scrubbers going into the men's quarters on pretence of work, and the scrubbers working under close supervision. This is a very important matter to consider. Women servants should not go into the rooms of the male officers except at fixed, regular hours to do their work, and elderly, respectable persons should be chosen for this business, and should besides be under careful supervision. Women servants should not be allowed to go to the rooms of private men patients. The nurse of the private patient should do all the work of the room, except the weekly or semi-weekly scrubbing, which is always to be done under supervision. Women servants should not be allowed to receive professional visits from the house staff except in the presence of the matron. If any servant or attendant is ill enough to require medical care and nursing, the matron should at once apply to the superintendent for his or her admission to a ward as a regular patient. All this is also applicable to women nurses. House-servants should never go to the wards except on necessary business, nor should nurses or patients be

allowed out of their wards except for good and well-known reasons. No loitering or gossiping in halls or on stairways should be tolerated. Having fixed and well-known hours for all necessary business is an important safeguard. Coming and going at other than these regular times must be satisfactorily explained, or the delinquent warned, and, if necessary, discharged. *No laxity in these matters should be tolerated for a moment.* One bad or sly man or woman poisons the whole atmosphere, and no matter how valuable otherwise, should be speedily got rid of. Drunkenness need scarcely be enumerated among causes for dismissal. Few hospital officers, however slipshod or time-serving, venture to affront the public by retaining drunken attendants about the sick and helpless.

Servants should have time given them for church-going, rest, and recreation, and that time should not be encroached upon. But they should be required to return at a fixed hour, and never be allowed to remain out late at night. If late or absent some very good reason should be given for it.

The matron should keep written records of the dates of coming and going, and of the wages of all attendants, and some note of their character and capacity, for the future protection of her own and other hospitals. She should also keep a record of the address of some friend of each in case of sickness or death.

Servants' quarters.—The matron should not fail to look into every attendant's dormitory, under the beds, behind the doors, and into closets, at least

once a day, and occasionally at other and *unexpected* times. She should inspect every day, and also at *unexpected* times, all the bath-rooms and water-closets or privies used by the attendants, and allow no filth, rubbish, or torn paper to lie about; newspaper does not easily dissolve in water, and if large quantities are used it sometimes chokes the pipes. There should be a regular disinfection and cleansing of all servants' water-closets, at least twice a week, on *fixed* days. Things of this sort done "now and then" or "frequently" are never thoroughly done. *Fix the day* and never allow it to pass over. Wherever the wall-surface admits, servants' water-closets should be whitewashed at least once in three months; if the labor can be had, once a month would be better.

The servants' hall or dining-room should be carefully overlooked, and neatness and propriety in table-service, dress, and manners strictly enforced. The table should be made comfortable, and the food, though plain, be as much varied and as good in quality as the hospital resources allow.

The matron should carefully examine the quality of all raw material of food, and if she finds it inferior, should so report to the superintendent, or to the proper inspectors if they call directly upon her for such information. Bloodless and stringy beef, rank mutton, and stale vegetables are not economical even though they may "go farther" than wholesome food. The purchase of food and the making of house-diet tables, will probably be in the hands of the superintendent or steward; but within certain

limits a good degree of variety can be had by putting brains into the bill of fare; and this is the matron's part. Those on extra duty as firemen, night-watch, and night-nurses, should have a little extra food supplied. Farinaceous foods are very nutritious, and should be freely used for that reason, over and above the reason that they are cheap. If the superintendent thinks best to allow a glass of milk once or twice a day at the servants' table, it would be a good thing, and would perhaps prevent the very common misappropriation of milk elsewhere.

What is a clean hospital?—The responsibility of the matron for the nursing and her control over the nurses vary in different hospitals. Where the organization allows there will be a head nurse in charge, who will be responsible for the discipline of the nurses. But the matron will certainly have under her care the cleaning and keeping clean of the sick-wards and all their belongings. Visitors cannot too strongly insist that everything in a hospital shall be kept scrupulously clean. Cleanliness and good discipline go hand-in-hand. The faithful or unfaithful execution of the matron's charge makes the difference between a healthy and an unhealthy hospital. Let her remember that human lives are at stake, and execute her share of the hospital duty as if all these lives depended upon her alone.

The first essential in keeping a hospital ward clean is to keep it perfectly free from dust. Dust in a ward is not only dirt, it is danger. The mode of cleaning must of course vary according to the surface to be cleaned, but the dust must be *taken away*,

thoroughly, regularly, frequently; not stirred up and allowed to settle again somewhere else, but taken away. The floors, walls, windows, door-frames, wainscot, cornices, mouldings, backs and top ledges of picture-frames and mirrors, door-sills, tops of doors, mouths of the air-shafts, the swing-sashes over the doors, the cupboards and tops of cupboards and wardrobes, fireplaces, water-closets, bath-rooms, clothes-shafts, dust-shafts; every square inch of surface everywhere must be kept absolutely free from dust.

Intemperance in sweeping.—Do as little old-fashioned sweeping as possible in the wards. No one who has given much attention to these matters can look on with patience while an attendant flourishes a broom in a ward in the middle of a thick cloud of dust, not one tenth of which is *got rid of*, but which flies up and settles again on every ledge and cornice, drifts over the beds and bedclothes, and what is worst of all, drifts into the lungs and pores and eyes of the unfortunate sick who cannot get out of bed, or out of the ward. In sweeping, a great deal of dust will escape in spite of every care, and drift into fireplaces, register flues, ventilating flues, open places of every kind, corners and cracks of every kind; therefore all such places must be carefully looked after and carefully cleaned out at regular, frequent intervals. In such places as these, left unwatched too long, dust will be found packed and felted in thick rolls like bits of dirty blanket; and such deposits as these are not only disgraceful evidences of ignorance and neglect, but contain germs of hospital disease.

For the sweeping that cannot be avoided, use on hard floors soft hair brooms in long strokes which carry the dust gently before them instead of allowing it to rise and diffuse itself through the air. Do not sweep from one end of the ward through to the other, driving all the dust along the whole ward. Begin in the middle, and sweep first one way, and then the other, constantly using a dust-pan; but sweep as little as possible in the wards.

Feather-dusters should never be used, unless it may be to bring the dust down from high levels to lower ones, where it can be reached and taken away with damp cloths or carriage sponges; *nothing will really remove dust but damp cloths or sponges.* Use as little water as possible, and use a little carbolic acid or soda in the cleaning water. Cleaners, unless watched, never change the water in their buckets often enough, but go on dabbing the floor with the dirty fluid; this, and their propensity always to use too much water on the floors, should be watched and checked.

Clean floors.—The ward floors in some modern hospitals are laid with glazed tiles; very little sweeping will be needed on such floors, but more wiping. They should be washed with a carriage sponge wrung out nearly dry. With such floors great care must be taken not to crack or chip the tiles. Cracks and chips make pockets for dust and filth. The whole surface of floors and surbases of all the wards should be gone over at least twice a week. If you can command the labor, go over the whole surface of the surgical wards every morning

before "doctor's call." Windows in wards, especially all surgical wards, should be washed, both wood-work and glass, once a week, including of course all transoms and swing-sashes over doors.

All hard wood-work is kept in the best condition by an occasional good rubbing with linseed oil with a little spirits of turpentine in it. This gives the wood a handsome appearance and fresh odor, while it helps to fill the grain and render the wood non-absorbent.

To sum up, do as little sweeping as possible; do as much dusting as possible; remember that dusting means *taking away the dust;* and for that purpose nothing is efficacious but *rubbing* with a damp cloth or sponge, and then with a dry cloth.

Clean beds.—The beds are the most important articles of furniture in the wards, and should be looked after with great care to prevent dust, vermin, and filth. The condition of the wards, as to clean and sweet air, depends greatly on the condition of the beds.

The matron should keep herself informed, by consultation with the head nurse, of every case of erysipelas, pyæmia, cancer, typhoid fever, or of discharging wounds, or of any other case in which the bed may be fouled or contaminated. All such beds should be taken out of the ward as soon as the patient leaves or dies; and the straw, if the beds are straw sacks, should be sent off the premises and burned in a pit on the grounds outside, and the sacks disinfected, washed, and refilled. If hair beds are in use for such cases, they must be promptly

taken out of the ward, ripped, steamed with live steam, thoroughly disinfected, and made over, in some room provided for this purpose outside of the hospital itself; *but even this cannot be considered a perfect preventive of infection.* Permanent hair beds are thought objectionable by many physicians. Hair is expensive, troublesome to pick and cleanse, and unless a hospital is very conscientiously and intelligently managed such mattresses are not made over as often as they should be, and infection is the frequent result. This is a strong argument in favor of wire-woven beds.

No hair mattress should be used more than six months without being ripped, steamed with live steam, or otherwise disinfected, and made over, no matter what the case. No straw bed should be used more than three months without being washed and refilled, full and squarely, with clean straw, no matter what the case. The matron or house-keeper should frequently examine the beds in each ward; by remaking a few mattresses at a time, patching and mending those that need it, she will find that the work never accumulates so as to become a burden. If hair mattresses are made in sections they can be more easily turned and aired, they wear more evenly, and can be remade with less labor.

Clean pillows.—With pillows the work must be equally constant and thorough. It is even more important to steam, disinfect, and remake the pillows, both hair and feather, from the cases above mentioned. All pillows should have periodic airing and cleansing, no matter what the case. They should

be made over at least once in six months. Shake the feathers from the pillows to be cleaned into a larger bag than the pillow sack—thin, unbleached muslin will answer,—tie up the bag, and steam bag, feathers, and all; or in ordinary cases hang the bag for some days in the air. Meanwhile wash thoroughly, disinfect, and mend the empty pillow sacks, and then refill them. A number of extra pillows should be kept for use on these occasions. Straw pillows, as well as straw beds, are best for some cases. In all these matters the matron must confer with the head nurse, and issue for use such bedding as the sanitary requirements of the special case may dictate.

Blankets should invariably be washed when spotted, stained, or dingy-looking, or when taken from the bed of a fever patient, or a bad surgical case, or when they have been used by a woman in confinement, or where there has been serious illness, or steady use. The blankets from infected beds should be not only washed, but disinfected, before being used again. There is a superstition that blankets need not be washed. But this is not applicable to hospitals. Blankets readily take up infection; their fuzzy surface is the very thing to catch organic particles and retain them until decomposition takes place, and thus poison the wounds of surgical patients. Blankets too good to be washed should never be used in a hospital.

Throughout the hospital the blankets and pillows should be taken, one or two dozen at a time (others being substituted from the extra supply in the linen-

room), and hung in the sun and air for a day, once a fortnight. Once a week, where the supply of bedding is ample, would be better. In fact, where there is a good sunning-ground, no dry, sunny day ought to be lost. Advantage should be taken of every such day for airing out-of-doors—beds, bedding, blankets, mattresses, pillows, and every article of bed furniture of all the sick and convalescents. Sunshine and wind are capital every-day disinfectants for bedding, and if such airing-work is faithfully done, the washing of blankets in general use will be less often necessary.

The storing of blankets in summer requires attention. They are safer on the open shelves of the linen-room in the light and air, but they should be frequently taken down, examined, shaken out-of-doors, and returned to the shelves, which have been meantime wiped down with a damp cloth and then a dry one. All rooms or closets where mattresses and pillows are stored, should be kept aired by open windows in dry weather, by night as well as day.

Steam-closets in connection with the wards, are a poor alternative for the open air for bedding. No *soiled* articles should ever be put into such closets. Steam-closets, if these exist, must be carefully examined; for, if the racks are stationary (they ought always to be movable), dust and fluff, *i. e.*, filth and disease-germs will drift into and pack in them in large quantities. The smell of frying dust can be detected in these closets or about radiating stacks whenever they are in ignorant and slovenly hands.

Sheets and pillow-cases should be changed throughout the wards at least twice a week; in some cases much oftener. They should be changed often enough to keep the beds with ordinary precautions always clean. There should be no skimping here. If laundry work must be economized, let it be economized in something else: say shirt-bosoms and frilled petticoats for the household, and not in the bedding or clothing for the sick. One musty, unchanged, and unaired bed will make a whole ward smell stuffy; how much more twelve or twenty such beds.

Ward bedside tables should be kept clean; no dirt or rubbish allowed to accumulate in the drawers. Never allow newspapers to be used as table-covers; nothing is more slovenly. See that the tops of all the tables are washed off every day. If covers are necessary, spread clean towels on them, *never newspapers.*

Cupboards of all sorts inside the wards are objectionable, and should be very carefully looked after, or they will become nests of slovenliness. No brooms, buckets, mops, damp dusters, or any thing of this sort should be allowed in them on any account; no dirty towels, no shoes, or clothing; nothing but clean, new, dry articles, such as new bandages, lint boxes, or medicines, if the doctors choose.

Dumb-waiter shafts, whether for the service or for the food, should be carefully watched, shelves scoured, and shafts whitewashed. No article whatever except food should be allowed in the food-lift.

Dust-shafts are as dangerous as clothes-shoots

in a hospital, and both need constant care. Fires in hospitals have been started and distressing panics risked by half-burnt matches, bits of oiled rag, and sweepings lying at the bottom of dust-shafts. They must be emptied and swept out at least twice a day, regularly closed up and disinfected by fumes of burning sulphur, and frequently whitewashed if the surface allows. They may be compared to a large-sized, perpetually dirty drainage tube. They carry danger with them, and are a bad thing in hospitals.

Refuse-cans are tight-covered, galvanized iron pails with handles, into which foul dressings, poultices, and old plasters are thrown at the dressing hour. The matron should inspect these cans with the greatest care, never less than once a day, and at other *unexpected* times. They should never be allowed to stand inside a ward, or in any bathroom, closet, lift or dumb-waiter. A bracket shelf outside the window of some lobby, hall, or closet, on which they could stand in the open air, would be a good thing. But they should never stand long anywhere. Their contents are always burned. They should be daily rinsed with disinfecting fluid, both can and *cover*, after every using; and if they get a bad smell in spite of all care, should be destroyed at once and new ones provided. They are an unpleasant necessity, and should be made as little offensive and dangerous as possible. They should always contain chloride of lime or fluid disinfectant enough to cover whatever may be thrown in; the lids should be tightly-fitting, and they should never be allowed, under any circumstances, to stand with any thing in

them uncovered. There should be two or four cans to a ward, according to the number of beds, so that there may be a place for foul dressings at hand at all times, and the cans not in use should be airing or sunning outside. Every private patient's room should have a refuse-can or cans of its own.

The outside of the building and the court-yards will probably not be within the [redacted]n's care. If they should be, she must see that every part is carefully policed every day: ash-cans, garbage-cans, dust-bins emptied; scraps of paper, orange peel, and all rubbish collected and burned; and if possible, where there is an abundant water-supply, the hose used for the windows and outside surfaces of the whole building not less than once a fortnight in good weather.

In proportion as all these details are attended to, and attended to with conscientious exactness, faithfulness, and clock-work regularity, the wards will be fresh, sweet, and healthy.

Nurses' quarters.—The degree of control of the matron over the nurses varies in different hospitals, as we have said, but the care and cleansing of all the nurses' quarters and dormitories will certainly be within her responsibility. She will also be required to see that their table is comfortable.

She should carefully inspect the sleeping-quarters of all nurses, especially men orderlies, at least once a day, and at other *unexpected* times, and should exercise a careful supervision over the nurses' bath-rooms and water-closets, thoroughly cleansing and disinfecting them at fixed, frequent intervals. If she finds a nurse's room out of order in any way,

she should after one warning, make a formal complaint to the head of the nursing department or to the superintendent. If nurses are allowed bedside carpets, or rugs in their rooms, they should be shaken out every day, and put out in the air, and beaten at least every week.

Clean water-closets.—The matron should inspect all ward water-closets and other service-rooms at least once a day, and at other *unexpected* times.

The closets should be washed out at least once a day with hot water and soft soap. If you can command the labor, wash them out twice a day, morning and evening. A weak alkali like soapsuds is not enough for disinfecting purposes. The apothecary should prepare and keep on hand the prescribed disinfecting agents, and issue them to the matron, with the necessary instructions, whenever she calls for them. Where there is no apothecary or medical officer, the matron should secure a supply of copperas (sulphate of iron). It should be bought in the lump by the barrel. A strong solution of copperas dissolved in hot water, in the proportion of at least two pounds of copperas to a gallon, should be used as the regular daily disinfectant; once a day for the ward closets and other offices; and at least twice a week for all other closets and drains in the institution. Wherever the surface allows, walls should be scrubbed or whitewashed. Never allow litter and paper to lie about. There should be a hanging box or basket for paper—not one set on the floor—in every closet or privy. Furnish brown paper. Paper on an endless fixed roll for closet purposes is to be

found in the shops. Don't allow newspaper if you can help it; it is less soluble than other kinds, chokes the pipes, and is very slovenly.

Privies.—The matron must daily examine the out-houses, where these exist, keep them freshly white-washed, and see that properly-sifted dry earth or ashes are at hand, and that chloride of lime is also regularly thrown in. Chloride of lime is a simple, cheap, and efficacious deodorizer. It helps to keep down gaseous emanations, and besides being thrown down should stand in large shallow vessels or boxes, slightly damped, in out-closets or privies; it needs to be constantly renewed.

Infected articles burned.—If, in a hospital where steam is used, there is no metal vat or fixture in which hair, feathers, or other articles can be steamed and disinfected, the matron should ask for one at once. It is easily arranged on the premises of any building heated by steam, and is indispensable. Where there is no steam machinery, a brick oven and tight-covered copper boiling kettle in some out-building, must suffice. But erysipelas bandages, or bandages from other infectious cases, should at once be burned. *No washing or disinfecting makes it safe to use them again.*

If there is an outside boiler-house and chimney on the grounds, its fire may perhaps safely be used, under the strict observation of the responsible officer, for burning infected cloths and the contents of refuse-cans. But such a process of burning in ordinary fires, or stoves, or furnaces would be a sure way of returning noxious air to the wards, and it must

never be attempted. It is best to *burn all infected articles and refuse-can contents at a safe distance, in a pit outside.*

Patients' clothing.—The cleansing and care of the clothing in which patients are admitted is part of the matron's duty, as the nurses can only take time to put up the packages and send them to the cleansing-room. Besides the clothes-closets near the ward, a general clothes-room in the administration building, well lighted and open to the air, in which to store the surplus clothes, handbags, and bundles of patients likely to be long ill, is necessary in a large hospital. The effects of the dead, also, must here be taken care of. These effects should never be retained longer than is absolutely necessary, and there should be rules fixing some limit of time and the final disposition to be made of them. A receipt book for the signatures of the persons to whom they are delivered should be provided. The utmost care will be required to keep any such room and its contents sweet and clean. For lack of proper care in all these respects vermin and disease are often introduced into hospitals. In a large public hospital in New York the writer has seen the garments of the newly-admitted patients, muddy shoes, and filthy underclothing, rolled in a foul bundle and carried to the "pawn shop," which is the local name for the clothes-room, to be returned *unwashed* to the patient many weeks later on discharge.

The oversight of the laundry and personal responsibility for some portions of the work are

part of the matron's charge, as described in detail in the chapter on the hospital laundry. She must daily inspect, direct, and advise in this important department, and examine every day if possible, and at *unexpected* times, the clean linen and the rooms and closets where it is kept. She must call the nurses' attention to untidiness or wastefulness; not forgetting in all cases, with nurses and with servants, to praise also, where she is able. Besides soap for ordinary use, carbolic soap, or other cleansing and disinfecting soap, should be freely issued for nurses and patients.

Hospital diet.—The subject of cooking for the sick and special kitchen arrangements would make a volume by itself, and must be left for another occasion. See that the cooking utensils and apparatus are always *scrupulously clean*; this has a great deal to do with the flavor and wholesomeness of food. If one dish tastes of another it is a pretty sure sign of half-washed pots and pans. See that the material is all good of its kind. Report it at once if it is not. It would be preferable to have only one quality of such provisions as butter and tea; if there are two qualities the best should be reserved for the sick, and the second best for the well members of the household. All meals should be exactly punctual. Ward diets should be served neatly and attractively. No time or trouble should be spared to see that the food reaches the wards hot and palatable. A fixed bill of fare may be said to be indispensable in a large institution as a measure of economy both of material and labor, but it might

run for ten days or possibly a fortnight undetected. A delicate patient goes wearily to a table when he knows that he has to meet the inevitable Tuesday corned beef or Wednesday mutton. He is more likely to eat heartily if he is not sure what is coming.

Kitchen and pantry waste-pipes often become clogged with grease unless there is an effective grease trap. To keep pipes clean, a hot solution of potash should be poured down them from time to time.

Inventories.—One of the first cares of the matron should be to make an exact inventory of all furniture, kitchen and ward utensils, linen, and other property in her charge; and these inventories should be compared with the articles at least once a month, and deficiencies noted.

In the care and issuing of the provisions and stores of all kinds, the matron should exercise constant vigilance and strict economy. Nothing is too small for attention. It is the little items, the half pints and the ounces, that make the difference in the long run. The ability of the managers to carry on the hospital without harassing care as to ways and means will depend greatly upon the matron or house-keeper. She should always keep in mind that it is other people's money she is spending, and should hold herself to a strict account of it, so that nothing may be misused or wasted, but every penny made to yield its utmost value, and do its utmost good. Every penny of the hospital funds spent upon her friends and visitors, or upon herself beyond her necessary comforts, is dishonestly spent.

A set of pantry and store-room rules and a table of quantities are given in the appendix.

Gossip and petty bribery.—A matron who respects herself and her work will be loyal to the institution she serves, and to her superiors in office; she will neither do or say, nor allow others to do or say in her presence, any thing that would injure or destroy the influence of other officers. She will not indulge in gossip or countenance it in others; if any one comes to her with idle or mischievous tattle she will at once show them that they have mistaken her principles and her tastes. This zeal in tattling is no mark of loyalty to the interests of the institution, for the persons who are so eager to carry about twaddle concerning what Brown said that Jones said that Robinson did, are the very persons who are most ready to cover up a real wrong or breach of discipline which ought to be reported, if it happens to be for their own interest to conceal it. A hospital officer of either sex who is a gossip, full of trivial talk about affairs concerning which he or she should be scrupulously reticent is a melancholy spectacle. No such person is fit to be entrusted with the grave cares of a household of helpless and suffering people.

A wise matron will never make the mistake of intimacies or familiarities with patients or attendants, or the still greater mistake of showing favoritism to any one, or bribing any one—for it is essentially bribery—with special diet or special indulgences which are not equally shared by the rest. She will deal out even-handed justice

and kindness to all, making no distinction in the public wards, except that of the greater necessity of the sick person. A matron who allows herself to make use of petty, selfish indulgences in order to persuade attendants to do their duty, sets the example, though she may not be conscious of what she is doing, of corruption in every branch of her household, an example of which attendants are sometimes only too ready to take advantage. There is no greater disgrace to a hospital than is suggested in the complaint: "I could not get waited on; but So-and-so" [who had influential friends or a little money] "had every thing he wanted."

There are hospital matrons and superintendents who are capable of keeping back for their own use a portion of the comforts and luxuries sent in as donations to the sick, on the theory that they "have a right to their share." Such persons will not scruple to get all they can out of a public or private charity: superfluities for their own tables, board and lodging for their "visitors," extra labor of all sorts in sewing-room, laundry, and kitchen; justifying their demands to themselves by saying: "I guess the institution can stand it." Types of this class may be found in every community, but any one showing the least trace of such a spirit is unfit for the responsible care of the sick and helpless.

VIII.

The Nursing Service.

Hospital management, besides the house-keeping duties proper—that is, the kitchen and laundry work, the cleaning, the care of all the property and supplies, and the discipline of the household,—includes another most important branch, namely, the nursing service. The following pages give a few hints on the duties of nurses, and the routine of ward work.

A responsible head.—To ensure proper distribution of labor and the best care of the sick in a hospital or infirmary there should always be one responsible woman as head nurse for the whole establishment, whether there is a training-school or not, and all the nurses, both men and women, should be under her control. Her duties are distinct from those of the matron or house-keeper, and are concerned only with the sick. A matron of the right sort will understand that the object of the hospital is the care and comfort of the sick, and that the entire household must be held tributary to this. In small hospitals of not more than a dozen beds, the two offices might be combined in one person; but in most hospitals the two classes of duties, nursing and house-keeping, furnish enough work for and require the undivided attention of two

separate persons. It would be quite as detrimental to good order and efficient service to leave the nurses without a head as to leave a household of servants without a matron or house-keeper. The nursing head, being held responsible for the care of the sick,—that is, for the right execution of the object of the hospital,—should be the superior officer and, should be allowed a woman assistant as house-keeper. But where the wisdom of this arrangement is not recognized, great care must be taken to define responsibility. Both head nurse and house-keeper should then report to and take their instructions from whoever is their immediate superior; where there is a training-school, from the lady superintendent or principal so-called.

Co-operation.—Whatever is the organization it will be found impossible to conduct hospital work in a peaceable and proper manner unless there is perfect accord between the head of the house-keeping and the head of the nursing department, and one sole purpose in all they do, namely, the order and general well-being of the whole establishment. Women who encourage petty differences, or who cannot set aside their own small personal jealousies for the sake of the serious business in hand, justify all the disparaging comments in which male boards of administration sometimes indulge.

Value of competent heads.—Only trained and competent women should be chosen to fill the responsible positions of heads of departments; and hospital authorities will find it in the end the best plan for securing good management, as well

as the best economy, to select such women, and to make their salaries and their surroundings inducements to them to value their places.

Where the hospital income is small, and managers feel that the services of only one skilled woman can be afforded, the position of matron is generally the one which they first prefer to fill. If women, in addition to their trained knowledge of bedside nursing, are well informed in house-keeping matters, they will find more ways of usefulness and self-support open to them. The varied duties of house-keeping and the mode in which they are performed have a most important bearing on the welfare of the sick; and on that account, if for no other reason, a head nurse needs to understand them.

Title of the office.—The nursing head may be called either superintendent, matron, or head nurse of the hospital. For convenience she will be called in the following suggestions head nurse; while the head nurse of each ward who, under the head nurse of the hospital, is responsible within her ward for strict fulfilment of doctor's orders, and for obedience to hospital rules, will be spoken of as "first nurse" of the ward; her assistants being "second nurse" and "third nurse" respectively.

Duties of head nurse.—It should be the duty of the head nurse to know the general condition of every patient under her care, and to inform herself particularly of the nature and probable result of the more serious cases. She should know just what material she has to work with; the number of assistant nurses allowed by the regulations;

the kind of work she may require of convalescents, and who these are; convalescent free patients as a rule being required to assist in the light work of the ward.

Convalescent helpers.—The question of a patient's ability or non-ability to work is strictly a medical one, and the head nurse should obtain a list of names of convalescents from the physician and submit it to him from time to time for such changes as he desires to make, in order that no injustice may be done. Free patients, or patients on any endowment equivalent to a free bed, able to perform light services, will sometimes shirk. The rare refusals to assist other sick in the wards, and most of the complaints, come from free patients. As a class, they are the most ignorant and the most disposed to grumble. On the other hand, a nurse, sometimes not understanding as she should the condition of a patient, may report him as unwilling to help her, when, with an appearance of health, a stooping position or unusual effort, as in pushing up a window, might be hazardous.

Patients who are able to do light services are better and happier when employed than when left idle, and they often ask for something to do. Occupation is frequently prescribed by an intelligent doctor as part of his mode of treatment of certain cases. A list of light occupations like the following may help the nurse in assigning convalescents to duty:

Convalescents may collect the plates, cups, tumblers, and spoons, from the bed-tables after meals; washing them in the appointed place; dust the win-

dow-sills, tables, and chairs with a damp cloth; be ready to bring a glass of water when needed, and to help at meal-time in carrying bowls and plates to the patients in bed; go on errands to the head nurse, and hang out bed-clothing on galleries, piazzas, or elsewhere to air, where these services do not involve too much walking about; roll bandages; scrape lint; sort clean clothing; help in the linen-room when the house-keeper needs assistance in light mending; watch in the wards while nurses go to their meals, being ready to call them if needed; collect and exchange library books; water and tend the ward plants; and such other little serviceable acts as do not make too great a drain upon the strength.

An uncertain dependence.—But the nursing service must not count too much on the labor of invalids and convalescents. It is an uncertain and inferior source of supply, and as trying to those who are responsible for getting the work done as the use of broken or imperfect tools to a skilled artisan. The real ward work and, above all, the real nursing can only be done by an organized corps of sound-bodied and sound-minded persons; and the employment of convalescents is urged rather for its good effect upon them than for its value to the institution.

Grievances.—It should be noted that hospital visitors do not always know what to look for, what to see in a ward; they confuse essentials and non-essentials, and are sometimes disposed to listen too readily to complaints and to criticise managers and nurses when it is their own inexperience which is

chargeable. They should remember that the niceties and the exclusive service of private nursing are out of the question in a public hospital, unless there were at least one nurse to every patient. They have only to call on their own recollection of cases of sickness in private families to understand this. Hospital managers have a delicate and difficult task to accomplish; they are responsible for the wise use of public funds; the service is expensive, hospitals are not hotels or boarding-houses; a few essentials are all that the best public institution hopes or professes to provide, and if essential points are met other things must be yielded. Many of the patients in the best public hospitals are under better physical conditions than ever before in their lives, and this alone sometimes makes them exacting. Besides, sickness, as a rule, is depressing. It often makes patients irritable and querulous. When the sick begin to get well they look at the world with other eyes and their small grievances disappear.

Let the visitor encourage the sick to count their advantages, to compare their own condition with that of other patients who are worse off, and to consider, even though they are feeble and suffering, whether there is not something they can do to help and comfort their comrades in trouble. In a hospital previously mentioned, the first gleam of contentment in the face of a sick woman was kindled by the suggestion that she might teach the little German girl in the opposite bed to write upon her slate. From that time, although she was helpless and mortally ill, and died in the hospital, she never

lost her cheerful courage or ceased her efforts to amuse and teach and lead to better thoughts the poor sick people about her.

Let the visitor put herself in the place of the nurse too, as well as of the patient, and picture what it must be to pass nights and days, not only in the midst of painful scenes, but responsible for the ceaseless round of the most wearing of all sorts of work. As a general thing nurses of a good class—we do not refer to pauper helpers—mean well by the sick under their charge, and try, ignorantly though it may be, to do their best for them. If the few essential comforts cannot easily be procured in a hospital, it is generally owing, not to the ill-will of the nurse, but to attempts at economy, unwise or enforced in the wrong direction, or to incompetent, faulty, or clumsy management, or possible dishonesty in some office or bureau—causes over which nurses have not the slightest control.

Complaints should not be ignored.—It is true that sometimes the only chance of redress a hospital patient may have is in an appeal to a kindly visitor. Poor people in public institutions are very helpless; they become parts of a great machine. While visitors receive complaints with caution, taking carefully into account the character and conduct of the complainant, let them not fail to learn for themselves whether there is any real ground for dissatisfaction, weighing the probabilities, not generalizing too hastily, and not expecting too many exceptions to rules in favor of this or that special protégé of their own. In the best hos-

pitals the rules are usually drawn with much thought and care; they are intended for the comfort and protection of all the patients; there must be general rules, and they must be made for average conditions. It is the regular hours and duties, the order and quiet, the being taken off his own hands and being told, now, you must do this; now, you must do that,—the assuming of the whole responsibility by some one else,—which is to many a patient an immense relief, perhaps without his knowing it; a framework that holds up the feeble man until he is able to act and think for himself.

The number of nurses needed for a given number of beds will depend upon the character of the cases. In an ordinary ward of sixteen or eighteen beds, mixed convalescents and sick—that is, those who can make their own beds and take their meals in the ward dining-room, and those who must spend the greater part of the time in bed—two or at most three regular day nurses will be sufficient. Including night nurses, there should be in a hospital at least one woman nurse to every six beds. No rule, however, can be laid down which will not have to give way to exigencies. One typhoid-fever patient, for instance, may need the constant attendance of one nurse by day and of another by night. The head nurse's knowledge of the nature of the cases under treatment will help her in fairly dividing the work. This division being made, it is her further duty to see that all her subordinates faithfully and carefully carry out the orders received from doctors, from herself, and from the board of manage-

ment as given in the hospital rules. The head nurse is responsible for the fulfilment of these duties by her assistants, and she should have a voice in the selection of the nurses and the right to recommend for dismissal those whom she finds unfit for the position. A code of hospital rules is given in the appendix.

Doctor's call.—In a small hospital where one physician at a time visits the patients, the head nurse is the one who should always be present at the time of the attending physician's visit, to accompany him from bed to bed, or ward to ward. She should at this time call to her and take with her the first nurse of each ward, and see that she takes down in writing all directions for the care of special patients. It greatly helps the prompt and efficient execution of medical orders for the head nurse herself to be on hand to hear the orders given at each bedside, to learn precisely what the doctor requires, and therefore what she must require from her subordinates.

If the hospital is large, and several physicians visit, perhaps, at the same hour, the first nurse of each ward should make the rounds with the visiting doctor in her ward, and convey his orders to her assistants. The head nurse of the hospital meantime should make a point of accompanying the physician who has the most serious cases of the hospital in charge.

In all general hospitals there are apt to be patients who, after the first crisis of an illness or operation, are left to the discretion of the young house offi-

cers, and in the press of more serious cases they sometimes slip into a dangerous obscurity. The head nurse should keep such patients under close observation, and on noticing any change of symptoms, which may escape attention otherwise, she should ask for instructions. Unexpected deaths among "convalescents" or "chronics," who have dragged along for months hardly attracting any attention, are not uncommon in hospitals.

Diet-orders.—Directions for proper diet of patients under treatment will be given by the physician in his daily rounds, diet-sheets or cards being filled in by him with the proper articles and their quantities, and the hours at which special diet should be given. These orders are the head nurse's authorization for either drawing on the general kitchen for diet, or for such raw material as she needs so as to have the special diet prepared under her direction, as may be the rule. No cooking should be allowed in the ward pantry beyond warming drinks or making simple gruels. If assistant nurses are to be taught cooking, it should be taught elsewhere. It would be a good thing if a nurse or attendant could be detailed, each nurse in turn, as the diet-nurse of the ward, her business being to distribute the diets, see that those in bed are served in a neat and attractive way, and that their little fancies, so far as proper, are consulted. She should have nothing to do with the medicines or surgical dressings. She might take charge of the inventories and be the property nurse of her ward, and might perhaps do light sewing or mending.

Daily inspection.—Having received her instructions and conveyed them to her subordinates, the rest of the day, with the exception of the necessary hours off duty for meals and recreation, will be given by the head nurse to seeing that her orders are being carried out. She will take care that the ward work is systematized and simplified as much as possible. She will assign convalescents to fixed duties. She will see that each first nurse has on hand the supply of basins, urinals, clean towels, soft rags, lint, soap—castile and carbolized—bandages, and disinfectants needed for each ward. She will daily inspect the ward closet where these things are kept, and give special directions for the proper cleansing and disinfecting of all vessels, which work properly belongs to the ward nurses. She will see that all the ward vessels are kept scrupulously clean. No crockery urinals should, if possible, be used; glass ones are now made. She will see that the ward attendants are furnished with disinfecting fluid, and with instructions how to rinse all these things; and will examine the ward vessels frequently, holding the glass vessels up to the light to see if they are smeared and cloudy, and finding out whether the lids of the chamber vessels are covered with poisonous dew on the under surface. All these vessels contaminate the air if they are not carefully looked after.

Nurses are responsible for the emptying and cleansing of all vessels, and they must do the work or see that it is properly done; but in well and liberally managed hospitals a ward-maid is assigned

to each ward for women, and one or more orderlies to each ward for men; these persons being under the direction of the woman nurse and relieving the nurses of manual work of this sort, and, what is more important, of the necessity it involves of too frequent absence from the ward. For certain ward duties in men's wards men attendants are indispensable, as for lifting helpless patients and giving baths, though the woman nurse in charge must be held responsible, and superintend what is done. A sick person is usually rolled in a sheet for a full bath.

Training assistants.—The head nurse will direct as to the proper way of bed-making, and the airing of beds and bedding, making sure that all blankets, mattresses, and pillows are exposed to the sun daily when possible, never less than twice a week, and always after a patient leaves. She will direct about the dressing and undressing of helpless patients, and of disposing promptly of soiled clothing, both outside and undergarments, according to rule; and she will see that the daily morning dusting with a damp cloth of the tables, window-sills, chairs, and other surfaces, is attended to. The general cleaning of the wards belongs to the housekeeper's department and will be done by her women; but many little matters are under the care of the nurses, and the neglect of them may end in discomfort and danger for the patients. It should be remembered that a nurse is not a scrubber, or a laundress, or even a cook, except in emergencies; and, although a good nurse should know how to

perform all these services, and should never hesitate to perform them on the ground that they are somebody else's business, yet they should not, as a regular thing, be expected of her. Her special business of nursing, if thoroughly attended to, will take all her time and all her strength.

Ventilation of wards.—The head nurse will constantly examine the thermometer to see that the heat does not exceed 68° or 70° during the day, or fall below 60° at night, following the doctor's directions, and requiring regular reports from the night nurses on this point. There should be a good thermometer in every ward. She will keep a careful watch over the ventilation of the wards, noticing whether on entering she finds a close, stuffy smell, and if so, at once applying the remedy, taking care that the ventilating system, whatever it is, is in use, or letting down the windows two or three inches from the top at intervals, on one or both sides of the ward, but in such a way as not to let the air blow directly on any patient lying in bed. There are always convalescents up and moving about, and the windows by their beds are the ones to let down. The head nurse will instruct her assistants in all these matters, not allowing them to fall into the vulgar error of confounding temperature and ventilation. It has been said to the writer: "Such or such a room cannot be badly ventilated; the thermometer stands only at 68°, and never goes above 70°." But the air in a room where the thermometer stands only at 40° may be foul; cold air is not necessarily fresh air,

though it is a common blunder among nurses to suppose so.

The night nursing is a serious matter and one to be carefully looked after. The head nurse appoints her women for this duty with the same reference to the gravity of the cases as by day. Doctors' orders must be faithfully followed all night, and a night nurse must know her business as thoroughly as a day nurse. If the head nurse is obliged to choose, let her rather put the inferior woman on day service where she is under closer supervision, and the superior one on night service. A large proportion of the sick will sleep quietly, but all seriously ill people need great care, particularly toward the chilly morning hours when the outside temperature may be suddenly lowered. The night nurse must make careful report of the night service on being relieved from duty; a written report for serious cases. Great care should be taken *to make the connections perfect* between day and night service. A light luncheon should be provided for the night nurses.

Ward gossip.—The head nurse will despise and discountenance gossip and tattle, and will teach all her nurses to despise them, never allowing them to tattle about their patients or to listen to those who do. She will remember and teach her nurses to remember that the necessary or enforced confidences of hospital patients as to their diseases, their personal history, their family life and troubles, are part of their misfortune, and as such are to be respected. If these matters come to her knowledge she will

hold them sacred. She will encourage her nurses to avoid disputes and jealousies among themselves; to settle their little differences frankly before they grow and get the upper hand; to help each other; to pull together, not apart. She will not let them count any service for the sick and helpless as "menial" service, if it is only the sweeping of a room, or the cooking of a mess of broth, or the emptying of a refuse-bucket. She will not slight or let them slight any thing, despising a poor and cheap quality of work as "eye-service." In all these respects she will train her nurses by example as well as by precept.

An ill-managed ward.—Keeping in mind what has been said above, a visitor with correct ideas about order and cleanliness and discipline will soon learn to see whether a ward is well or ill managed.

Does she feel a sense of oppression on going from the fresh air into the ward? Is it a little difficult to breathe? Is there a close smell, and do patients and nurses look flushed and languid? The ventilation is neglected here. Are the bedquilts all put on at a different angle, some touching the floor at the foot, others leaving the blankets exposed, with a general untidy, irregular look up and down the ward? At what angle is the table to the bed, and the bedside carpet to the table? Are there on the table a roll of sticking-plaster, a bunch of lint, some sort of slop, and a wet circle where the basin was put down when the surgical dressings were made? Are the clothes of the patient who has been in bed a day or two in a heap on the only chair allowed

him, or festooned about his head? Are the cups and plates of the last meal still on the bedside tables, long after the hour, and sticky spoons lying without any saucer or mug under them? Are newspapers used as covers for the bedside tables, and are glasses of flowers standing, the dark color of the water in them showing that it has not been changed to-day? Are unsightly vessels kept in full view of the ward, on the table or chair, or under the bed, or mixed up with a mug of beef tea, a tumbler of milk punch, and a sputa cup, all as close together as possible at the bed-head? Are vessels rinsed in the bath-tub; or are dishes or clothes washed there?—an abominable practice. Is there a smear of beef tea or gruel on the bedclothes, and a stain of the same sort at the corners of that helpless patient's mouth; and is the man in the next bed engaged in wiping his mouth on the back of his hand, or on the sheet?

An incompetent nurse.—Does the nurse stand with her hands on her hips, or fumbling with her fingers at something all the time she is speaking, answering the doctor's questions with a "Well, I guess so"; or "I rather think he slept about" so long, or ate "about" so much; or it was "kind of middling" this or that? Does she discuss the patient with his friends or other nurses in his hearing, or criticise before him the doctor's directions, thus destroying his confidence in the physician? Does she speak of him as "the cancer man," or "the man with a head" if he has a scalp wound; or sit on the edge of his bed, shaking it, and saying, "You 're

nervous, that 's all," when the patient is restless? Does she permit loud talking and unnecessary passing in and out? Does she allow strangers to peep behind the screens out of mere curiosity?—a common practice, and one very offensive to most sick persons. Does she taste the sick man's food in his presence with his spoon to see whether it is right, or snatch the towel his hands have been wiped on to tuck under his chin when she feeds him; or bring in a clumsy china quart bowl full of milk, setting it down with the remark, "Here 's your dinner?"—the "dinner" standing untasted, because holding such a heavy bowl is out of the question for the patient, and drinking from it lying flat on his back is equally impossible. Is the poor fellow in the next bed trying to manage his dinner in the same position, tipping up the flaring bowl, while a little stream of milk from either corner of his mouth runs down his neck? Does the nurse stick pins over the waist of her gown, ready to scratch or stab the patient? Does she wear trailing skirts and loose frizzes of untidy hair? Does she describe in portentous whispers all the diseases of her relatives and friends? Where is the convalescent who should be on duty while the second nurse has gone to her dinner, and who might be fanning that paralyzed man whom the flies are making uncomfortable?

Such special evidences of incompetence and confusion show that there is no efficient oversight of the nursing in this hospital. There has been a sort of scrambling activity in the ward; beds have been made, meals served, and dressings attended to—but

how? How they should have been done can perhaps best be shown by sketching an orderly ward and the manner of caring for the sick in it. Though minor methods differ in hospitals, according to place and circumstance, the principles which should rule the nursing service are essentially the same everywhere.

A well-managed ward.—It is a ward say of sixteen or twenty beds, and a number of the cases are serious ones. There are a first nurse and two others, her assistants. The matron's part of the general cleaning will be well done by her servants later; the nurses only are on duty now. It is the hour for beginning the day's work. They have stopped a moment in their own dining-room or the ward pantry, and taken the cup of tea or coffee or milk with a roll or cracker, which should be ready for them, and they have begun their work promptly, reaching the ward a few moments before the night nurse is relieved. There should always be an exactness amounting to "snap" about ward work, but snap does not mean "slam." The convalescents are already moving, having been directed to take the bedding off their beds and hang it over the chair at the foot; to double back the mattress and shake up the pillow—it is the work of two minutes—and then go at once to the wash-room. Each patient finds his towel ready on a peg numbered to correspond with his bed. There is soap enough, and hot and cold water, and each patient is expected to have in the stout, washable cotton bag hanging from the peg his tooth-brush, hair-brush, and comb.

The washing over, the clothes put on, each patient can give a finishing touch to his toilet with a clothes-brush, several of which are hanging by chains fastened to the wash-room wall.

Morning work.—Breakfast is now ready, and convalescents go directly to the ward dining-room, where one of the attendants superintends the meal. Meantime the nurses have been busy with the helpless patients. They have brought in basins of warm water, soap, and towels, and have washed the faces, necks, and hands of their sick people; have smoothed their hair, given them water to rinse their mouths, and a bit of soft linen or their brushes to help in the cleansing. They have shaken up the pillows and straightened the sheets and bed covering, and taken away all basins, towels, and cups at once, leaving the tables cleared for the breakfast which is now to come. All this takes time; sick persons must not be hurried; a good nurse always remembers this.

Fresh air and appetite.—Just before breakfast the nurse throws a light extra blanket over the patients who remain in bed, covering them head and all. A large umbrella, opened, with a sheet or shawl thrown over both it and the patient is a handy device; and she opens the doors and windows for a few minutes and lets the out-door air flow through the ward. This is not a thorough process of ventilation, but it is better than nothing, and except in severe weather a ward can be perceptibly freshened in this way with very little lowering of the mercury. She then shuts the windows, turns down the blank-

ets, and breakfast may come in. She finds that this simple freshening of the atmosphere makes the difference with some of the feebler patients between eating and not eating their breakfast. She has noticed that in private houses a sick person almost always eats with a better zest if he is able to bear being carried into another room for his meals. She cannot do this for her ward patient, but she does the next best thing she can. She brings a fresher atmosphere to him. In illustration of this matter it may be noticed that when the visiting doctor makes his rounds at dinner-time and takes down the surgical dressings, three dinners are usually carried away untasted, for every patient examined; the dinner of the patient himself and that of the person on each side of him. It needs a robust appetite to overcome ward associations.

Feeding patients.—Whatever the breakfast is it has been put on little trays in the dining-room by the person in charge there, in accordance with the diet-sheet, and is brought to the bedsides. Whenever a patient can make out to feed himself, though the process may be a long one, he likes to do it, and he is propped up in bed with one end of a clean towel tucked in his neck, and the other pulled down over the sheet; then his little tray of food is put before him. Nurses in the well-ordered ward we are describing have put the liquid food not in bowls, but in small mugs with handles and broad bottoms, and the patients find it easy to sip what they want. If the patient is one who needs to be slowly fed by the nurse, the same care as to propping up and protect-

ing with a clean towel is taken, and the food is given in manageable mouthfuls.

Breakfast over, the nurse or convalescent appointed to this work carries away the cups and plates from the bed-tables, and the nurses go to their own meal in turn. Patients who are up and about come back now to the wards, make their beds, and put their tables in order. All quilts are spread at the same height from the floor, and all furniture and bed-carpets put at the same angle to the beds. No extra clothing of any kind is allowed tucked about the tables or beds, every article not in use being laid away by the nurses at once in a locked, light closet or room, outside the wards,—a well-ventilated closet,—with numbered shelves or pigeon-holes to correspond with the beds, and numbered pegs for hats and overcoats in the case of men patients. Messes of all kinds are cleared from the tables, convalescents being required to keep their own tables neat, though in all these matters the nurses help and give directions.

Liquors and medicines are kept in a locked closet in the ward, with numbered divisions, only the first nurse or doctor having access to the closet. The hours at which doses are to be administered are carefully set down by the nurse in her note-book for serious cases and crossed off as each dose is given. Some such little plan proves of great assistance in preventing unfortunate blunders. Convalescents come at the proper hour to the medicine closet, where the nurse stands ready to give them their doses in accordance with the time noted for each on

a slate hung by the closet. She has her bowl of fresh water and clean towel to wash the spoon or glass she uses for the patients in turn.

Doctor's rounds.—By this time in an orderly ward it is nearly nine o'clock. The nurses have returned from their breakfast and now begin the washing of wounds, the bandaging and changing of poultices, and the house physician goes his rounds accompanied by the first nurse of each ward, who gives him the report of the night, which, for all serious cases, she has received from the night nurse in writing. This is the hour when the head nurse of the hospital will make a round of inspection, taking mental note of carelessness or inefficiency, for future use in instructing her nurses. At all times she tries to impress on them the importance of the utmost cleanliness in washing or handling wounds, and of exact attention to orders; the success of a case often depending upon the nurse's care. She reminds them that they must not take shelter in these matters behind the use of "antiseptic treatment" by the doctor. The most fastidious cleanliness is the best antiseptic.

Consulting doctor's rounds.—By eleven o'clock, in a ward of the size and kind described, the dressings are finished and the untidy traces cleared away; all unsightly vessels have been removed and washed, all light brushing up and dusting is done, and the whole ward and its adjuncts are in readiness for the physician of the visiting-staff, on his daily round of the wards. He is accompanied by the head nurse of the hospital or the first nurse of each

ward in turn, the first nurse noting attentively all orders given, and writing down any special directions for serious cases. If the attending physician's visit is made at a fixed hour every day, it of course helps very much in systematizing the ward work.

A new patient is to be admitted, perhaps, this morning, and the head nurse has been notified by the superintendent to have a bed ready in this ward, and word comes to the first nurse accordingly. The new patient is sick enough to be put in a detached room, but the resources of the hospital are not sufficient for this. The nurse tries therefore to isolate him as far as she can, by selecting a bed next one occupied by a convalescent, say, who will, if rules are obeyed, spend most of his time away from the ward. She clears away every superfluous article from table and window-sill. She carefully makes the bed with reference to a long occupancy, protecting the mattress with rubber sheeting, spreading over it the under sheet and tucking it in firmly on all sides. Over this she puts a second rubber cloth covered by a draw-sheet, for the man on arriving must be bathed in bed. She adjusts the blanket, upper sheet, and quilt, doubling them back lengthwise of the bed, and placing the pillows as she wants them. She has towels, soft cloths, soap, basin, clean night-shirt and socks ready, and the screens at hand to shut off this part of the ward for the time as much as possible.

Meanwhile the patient is to be removed to the hospital from some distant part of the town ; taken, it may be, out of the small tenement-house room

which he has shared with all the other members of the family, who can ill spare him a warm wrap. If the hospital sends its own conveyance to fetch him, and the matter is within the province of the head nurse, she will make sure that a blanket is sent to cover the man in cool weather, and a mattress and pillow if the case requires it. She will see that he is carefully carried to the ward on the mattress or stretcher, or, if not ill enough for that, but still weak and forlorn, that there is ready a light, strong chair with arms, or a canvas seat with waist belt, and slung between poles, in which he can sit while two men attendants carry him up.

First bath.—He is in the ward now, or, if the hospital is a model one, in the ward reception-room or examining-room, adjoining the bath-room; at any rate, he is where the next step must be taken toward making him comfortable. If he is exhausted or excited by the drive, the nurse lets him lie or sit still for a while, giving him a little simple nourishment, a few spoonfuls of beef tea or a drink of milk; no spirits without orders; after which, with permission of the doctor, she proceeds to undress him and to see that he gets as gently as possible the bath which the rules of the hospital prescribe. Either the patient will be put into the tub by the men orderlies, or, if he is too feeble for this, the nurse will herself wash him thoroughly with warm water and a soapy cloth, as he lies on the bed she has prepared, lightly covered with a sheet, or blanket, under which she passes her hand. A bath-brush should be used for the feet. Full directions for bathing patients are given in any

good book on nursing. One or two good manuals of nursing should be in every ward library.

In all cases the nurse should ask the doctor whether he sanctions the bath, and then should let no unwillingness on the part of the patient keep her from this duty. Having washed him, slipped away the draw-sheet and rubber-cloth, and dressed him, she covers him up, and gives him a little more nourishment if he is exhausted—Miss Nightingale's rule is that new patients are to be considered on fever diet, that is, milk diet, until such time as the doctor gives his own orders—and she leaves the screens about his bed to let him rest. He will probably fall into the best sleep he has had for many days. Now a window is let down in such a way that there is no direct draft upon him, for this warm bathing of unclean surfaces, when properly done, contaminates the air, and the vapors must be got rid of. For this reason all bathing should be done out of the ward when possible.

The cloth clothing of the patient has of course before this been made into a bundle and sent to the cleansing-room, his soiled clothes to the laundry, and all his little pocket treasures have been taken charge of by the nurse, who first shows them to him with the assurance that they are safe. The after-care of the patient is in accordance with the directions given by the doctor, which will be implicitly carried out.

A competent nurse sets down in writing all information likely to be called for as to pulse, temperature, and secretions, and is ready to an-

swer the doctor's questions promptly. She moves quickly and quietly; she wears a plain washable gown and fresh white muslin cap, and her hair is simply and smoothly dressed. She knows the name of her patient; she keeps his mind free from anxiety, and does not discuss him in his presence with any one except the doctor. She does not allow the bed-pan or urinal to be conspicuous, but removes all vessels at once, washing and rinsing them with disinfectants in the sink provided for the purpose. The vessel which must be at hand for instant use she keeps, when washed, out of view. All sights of sickness in general in this orderly ward are kept out of the way as much as possible. This promotes cheerfulness as well as cleanliness, and cheerfulness is a medicine in itself.

Nurses off duty.—The first press of ward work is now over. The head nurse takes this time to find out whether all that is needed for the next twenty-four hours is on hand, and makes requisitions on the house-keeper for what she wants, keeping her requisitions copied in a book for inspection by the proper authorities as an inventory of the supplies furnished her. This is a good hour, say between eleven and one o'clock, to send half the nurses off duty, and it should be insisted upon that three times a week at least they go away from the hospital entirely and into the open air. Their times for this recreation will necessarily depend upon the exigencies of the hospital service, and upon the hour at which the attending doctor makes

his visit, but a watchful head nurse will see to it that her assistants are kept in good condition by out-door influences.

Afternoon work.—Dinner-time comes now, and the rest of the day's care of the patients repeats the morning work. When afternoon dressings are to be made, or baths given, the head nurse takes care to be on the spot to instruct those whom she noted in her morning rounds as inefficient. She calls the first nurse of the ward and has her do the work before her, or she does it herself and makes the assistant watch her in every thing. By such pains as this, all hospitals, whether they have training-schools connected with them or not, become schools, and at any rate train their own attendants, to the very great advantage of the institution.

Men patients less exacting than women.—In the experience of the writer, and in that of most hospital visitors, men patients are more likely to be neglected than women. This is partly because they are usually less sensitive and less exacting than women patients, and partly because some women nurses when appointed to men's wards are kept from a quiet, simple, official performance of duty by mock modesty; while men nurses, whom it is the custom to employ in some hospitals, are in every way a notoriously inferior class. Dr. Gross hardly overstates the case when he says that "in the experience of the American physician, drunkenness and male nursing are almost synonymous terms."

Bathing and out-door air.—A hospital always has, or should have, its own general rules concerning

bathing and out-door exercise, which it is the duty of the head nurse to see are observed. All patients, unless forbidden by the doctor, should be compelled to wash their whole persons twice a week. Those who are in bed should be sponged daily, or as often as the doctor permits. All patients able to leave the ward should be sent out of it, and kept out as often and as long as possible; in this way the air remains purer for those who must stay in bed, and the convalescents themselves are put in healthier surroundings. Some sheltered piazza where wheeled chairs can stand, some room on the same level with the main ward where newspapers and games can be kept, are humane provisions, and essential to the best conditions for recovery. In a two-story hospital the women should have an upper piazza, the men patients using the lower floor.

Poorhouse nursing.—Visitors must not assume that the orderly and careful system of nursing above described is inapplicable to county almshouses and asylums. There are such institutions which are models of excellence. The workhouse infirmary in Liverpool will be remembered as the scene of Agnes Jones' life and services, and as the pioneer in the work of pauper hospital reform; Crumpsall Infirmary, at Manchester, has fourteen hundred beds, and with one exception is the largest known; these, with the workhouse hospitals at Leeds, Glasgow, and others in London and elsewhere, have trained nurses, some of them trained superintendents, and rank among the very first in good management, order, and nursing. Irrespective of faulty construc-

tion it ought to be possible to bring the one or two sick-wards of every poorhouse in our State, in their internal management, up to the standard of at least ordinary hospitals. Very few counties can claim to have reached this point.

Deaths in poorhouses.—Official reports for 1882 give a return of one thousand and ninety-nine deaths during the year, in the county poorhouses of New York State. These deaths imply a considerable amount of preceding sickness. Under right management, indeed, poorhouses are little else than infirmaries. Where the efforts of local committees result in drafting away the children and the able-bodied vagrants, the county-house population comes to be more and more one of chronic invalids and defective and feeble-minded persons. Old and infirm people often need as tender care as the sick. In some poorhouses invalid and helpless persons are now in the majority. In all of them will be found (besides those who are broken in health by vice) decent but destitute persons, for whom, in the remoter districts, there is no other refuge in mortal illness than the poorhouse.

Poorhouse nurse.—In addition to the improved hospital accommodations required in many counties, there is the sorely felt need in every poorhouse of at least one intelligent, trained, and salaried nurse, whose services are demanded both by humanity and by a just regard for sound public economy. In small institutions, especially where there is no resident doctor, or in remote places where medical visits are infrequent, the presence of a competent

woman would be invaluable. She should have sound health, and a cheerful, kindly courage, not shrinking from sickness which is often the result of evil life, and knowing how to make the most of simple materials and to give relief by simple means. Much suffering and loss of life, which now occur unseen by the public in our poorhouses, might thus be prevented.[1]

Infectious disease.—Wayfaring poor who are lodged for a night or two in poorhouses often bring contagion; and the knowledge, on the part of the keeper and the nurse, of how to deal with smallpox or typhus fever or other pestilent disease dangerous to the household, is important. A refuge hut or tent should be used to isolate such patients, and poorhouse officers should provide themselves with the instructions of their State Board of Health on these subjects.

[1] In Rensselaer County the appeals of the Association's local visiting committee have had a substantial response from the Board of Supervisors. Ample hospital wards for both sexes have been arranged, and an experienced trained nurse is employed. Dutchess and Steuben and other counties are moving in the same direction.

IX.

Care of the Insane.

Humanity and public economy forbid the treatment of the insane under a uniform system adapted to sane paupers. Insane persons as a class should be separated from the poorhouse management. The proper construction and organization of hospitals for their benefit form a distinct subject, although many of the details as to general care and hygiene, already given in this hand-book, will apply to such hospitals.[1]

Faults in buildings.—Unfortunately in New York, except in a single case, the insane ward, or asylum, is a regular part of every poorhouse establishment, maintained out of the common fund, and under the direct control of the county superintendents of the poor. Serious evils are the manifest result of this plan. Among common faults in the buildings themselves may be noted: the small, overcrowded, and often very cold rooms; the want of light and cheerfulness; narrow, steep staircases; bad air, bad drainage, improperly placed water-closets; insufficient water-supply; and faulty arrangements which interfere with complete and careful supervision. The prison-like buildings, the high fences,

[1] See also Suggestions for the Use of Visitors to the Insane—publication No. 22, State Charities Aid Association; and reports of the New York State Board of Charities.

padlocks, bars, and grated windows, suggest force and resistance; places of detention, not of cure.

Faults of management.—As almost invariable evils of poorhouse management of the insane we note: the want of systematic, skilled medical care; lack of healthful occupation and of out-door amusements; lack of proper clothing; unregulated, unsuitable diet; that gross outrage on helplessness—opportunity given for improper association of the sexes; inadequate number of paid attendants, with the usual temptation to resort in such case (especially during the night) to mechanical restraint,—cribs, camisoles, hand-cuffs, belts, and shackles; and during the day, and in the absence of the keeper, the plan of locking up the insane department and taking away the key.

The condition of the insane poor is pitiable indeed. They are even more helpless than children. Their word goes for nothing; they have literally, in one sense, no friends—not even themselves. They need every humane safeguard which can be thrown around them. Ignorance is cruel. Fear is cruel. And this most helpless of all classes must often suffer through the ignorance and fear as well as the incapacity of keepers and attendants. Insane hospitals are frequently built in secluded places; they are less open to ordinary public inspection than other charities. Yet of all institutions they most need the constant, rigorous, humane supervision of disinterested persons, in order that the rights of the poor may be surely, steadily, and systematically protected.

Responsibility for the alleged abuses of insane asylums, involves all ranks from supervisors and superintendents of the poor down to the humblest attendant, but it begins with the public. Official inspections of public institutions are apt to be hurried and superficial, and made at expected times, when the place is in its best order. The event of the season over, the institution lapses into the old routine. A system, therefore, of frequent, unofficial, and unexpected visits by local committees would bring out the facts with more exactness as to the average condition. Recent State legislation in Pennsylvania provides for such inspection by mixed committees of men and women.

Prompt treatment necessary.—The first efforts of visitors should be directed toward the enforcement of the law which forbids the detention of any case of recent insanity in any other place than a State hospital, or such other authorized asylum as the law directs. No time should be lost. To ensure hope of recovery the majority of the insane require prompt treatment, trained attendants, generous diet, and all the skill which physicians can bring to bear on the case. All these can best be secured in establishments which command the right sort of professional service, and where some of the expenses which proper treatment entails may be economized by concentration. But individual professional care of individual cases by a good medical superintendent is the essential feature of successful asylum treatment; and therefore concentration of numbers should never be carried to a point which would make such individual care uncertain.

Delay, a violation of law.—The sooner recent cases can have the advantages described, the larger will be the percentage of cures. The burdens of taxation are enormously increased by delay. Cases which might be cured under prompt and proper care, if detained in county poorhouses, pass by such neglect into the hopeless condition. The average duration of life of a person who has become incurably insane is eighteen years. "The wrong done to the insane in thus jeopardizing their chances of recovery, and the additional burden cast upon counties and the State by any process of manufacturing cases of chronic insanity, are violations of law," and should be recognized as such by visitors.[1]

Moreover, cases legally considered "chronic" are not always incurable; and incurable patients may often be relieved by suitable treatment, and their lives made not only less distressing to themselves and to those about them, but useful, in a measure, to their families and to the State.

State care.—The State Charities Aid Association, therefore, affirms its distrust of the plan of multiplying county and district asylums under the poorhouse system. It repeats its recommendation, that the State should take charge of all the work now attempted by the counties in behalf of the insane; and once more urges, as the least expensive and most suitable measure, that enough simple cottages and dormitories to meet the need should be built on the grounds of the State hospitals.[2] Expert medical

[1] Dr. Ordronaux.

[2] Third Annual Report, State Charities Aid Association, 1875.

superintendence would be at once available; classification of patients could be readily made; selected groups of patients could be cared for and furnished with occupation in the cottage colonies; and in case of any access of mania such patient could be moved to the appropriate ward. Workshops should be provided, simple trades practised, and farm and dairy work carried on. An instance of what may be accomplished in this way is seen in the Willard Asylum at Ovid. The asylum and colony of Fitz-James at Clermont, France, is a notable example of the separation system of treating the insane and of the curative effects of occupation.

Paying patients.—The State hospitals were established by law for the needs of pauper and indigent insane. "Whenever there are vacancies in the asylum, the managers at their discretion may authorize the admission, by special agreement, of recent cases under peculiarly afflictive circumstances, or which seem to promise speedy recovery."[1] But the better class of paying patients here alluded to should never be multiplied to the exclusion of the county poor, for whom these institutions were built. Our first duty is to those who, if not allowed the benefit of State care, must be remanded to the hopeless life of the almshouse. Every thing should be done to foster a kindly relation between the insane and their friends, and the latter should be encouraged, for the sake of family ties, to render whatever assistance is in their power. But in admissions to the State hospitals the law provides that

[1] Chapter 446, Title 3, Laws of New York, 1874.

such insane poor shall take precedence of the rich. Many of the poor in asylums are not paupers in the ordinary sense. It is their misfortune which has impoverished them.

Discharges.—The statute further permits managers of State hospitals "to discharge any patient upon the superintendent's certificate that he or she is harmless and will probably continue so, and is not likely to be improved by further treatment in the asylum; or when the asylum is full, upon a like certificate that he or she is manifestly incurable and can probably be rendered comfortable at the poorhouse, so that the preference may be given in the admission of patients to recent cases, or cases of insanity of not over one year's duration." Until the State has provided the full accommodation which is needed, recent cases, as the extract quoted from the law shows, must take precedence of cases of longer standing. Visitors are therefore urged not to relax their vigilance in behalf of the so-called chronic insane, discharged from State hospitals, but to secure for these unhappy people whatever degree of comfort and humane treatment may be possible, temporarily, under the poorhouse system.

Insanity a disease.—The best service which visitors to the insane can render is to try to break down the mystery and terror which hang about lunatic people and the places where they are confined. Insanity is a disease. Patients should be cared for as sick persons, individually, not punished for being "disagreeable," even when their insanity, as often happens, is the result of evil ways. Insane persons

are not insane in all directions. Talk to them on a variety of topics, and on some they may answer you rationally. Treat them courteously, gain their confidence, let them see that you are interested in them and they will give you less trouble. If a man wants to shout and sing, let him do it; he will soon tire of it. If he wants to run up and down, do not shut him up; it hurts no one. If he must tear and destroy, let him spend his energy on old garments, or give him garments that he fancies; do not excite him by tying his hands.

Dress.—Refractory lunatics who tear off their clothing, frequently do it because their skin is so sensitive that they cannot endure the irritation which clothing occasions. Garments for lunatic patients should be warm—for such patients are peculiarly sensitive to cold—but they should be soft, light, and varied in color and style. Dress is a moral element in the treatment of certain cases.

Restraint.—Wherever visitors notice a large provision of restraining appliances in an asylum without finding also strict rules for their use, they may safely infer the existence of abuses. Attendants, if they have the chance, find it easier for themselves to put excited patients in restraint than to try to overcome excitement by personal, individual effort in the ward. The gathering up of all the muffs and camisoles, and their removal to the doctor's office, mean greater personal attention on the part of nurses and attendants. The best "appliances" are fresh air, quiet, good food, warmth, suitable clothing, congenial occupation, and a good attendant.

The kindly courtesy shown by visitors toward patients will have its effect upon the attendants, and help to give a better tone to the ordinary intercourse in the ward. The little talk also may often make it manifest, even to casual visitors, that the seemingly quiet, inoffensive person is unquestionably insane, and that the physician who insists that the patient is unfit to be set at large is right.

Food.—The effort in all public institutions to curtail expenses shows itself, generally, next to curtailing the number of employees, in the quality of the food. The diet is often injuriously cut down. The diet in lunatic asylums should be not only generous and wholesome, but varied, and served in neat and attractive form. The insane as well as the sick often have unexplained but harmless fancies, and humoring these fancies is sometimes a help toward inducing a patient to take the required amount or kind of food. Visitors should note what is the management in these matters, by occasionally timing their visits at the dinner-hour.

How to find suitable occupation for the insane is a question which constantly comes up for solution where there are right thinking hospital officers. It is a matter which may well enlist the attention and help of visitors. "Rightly understood, it means the creation around each patient of a new world, built up out of his own awakened and directed activities."[1] Light employment should be urged, but not forced upon patients. They should be encouraged

[1] Dr. Mary Putnam Jacobi: *Journal of Social Science*, No. 15.

to do things voluntarily, and to regard their work as done for the general good. Give insane people, as well as sick people, some interest outside of themselves, and, if possible, in behalf of others. Simple fancy work for sale might sometimes be tried, or braiding straw and weaving baskets, knitting lace, carving in wood, painting, or making artificial flowers. Many articles would be failures, but ingenuity would be stimulated and interest roused. Music might often be made available in the care of the insane. The influence which music exerts on certain people in certain moods ranks it among the more important directly curative agents —it is not occupation merely. Of course every sort of out-door exercise, whether for employment or amusement, should be encouraged, with both men and women patients. But in order to furnish light and suitable work for all who require it, the hospital grounds must be ample. The out-door life is beneficial, even more than the occupation. It promotes healthy appetite and sleep. Pains should be taken to vary the occupations; insane people are incapable of continuous labor, and it would be unwise to exact it from them.

Vigilant oversight.—The cleanly condition of patients, the appropriate clothing, the good ventilation, the airy, cheerful, and well-warmed rooms, the farm, the gardens,—all the arrangements throughout the establishment should be such as indicate unceasing vigilance of skilled officials and attendants. There should be no "airing courts" therefore —that is, small yards surrounded by high walls or

fences, where patients are turned out to air or to walk about. Where airing-courts are in use, attendants are apt to think that patients can come to no harm, and watchfulness is relaxed. "Airing-courts are a mistake, especially in the case of women patients; the system permits every insane propensity to run to weeds." This is the judgment of Dr. John Fraser, the physician in charge of the pauper asylum for the counties of Fife and Kinross, Scotland. This asylum holds about three hundred patients, both acute cases and those of long standing. One paid attendant is allowed for every twelve patients. The features which distinguish this institution are: unlocked doors for all but the violent cases; a great amount of general freedom; regular occupation; the work in the garden, the laundry, the kitchen, and the sewing-room, making the asylum a beehive, and reducing the number of the actually idle to a minimum; lastly, the disuse of airing-courts.

The skill required in attendants for the insane differs from the skill of ordinary nursing. There should be special training, and the organization of a training-school for this purpose in connection with one of our large asylums is an imperative necessity. The attendant should be an even-tempered, gentle, forbearing, but firm person, truthful and self-controlled,—one who is untiring in efforts to employ and divert her patients; quick in noticing the symptoms of coming excitement, but never fretting the patient by too obvious notice, or too many and unnecessary checks. Women physicians in the women's wards of insane asylums are in the highest degree

desirable. Patients confide in them with greater freedom, and with less excitement than is sometimes caused by the presence of a male physician.

Visitors should carefully note those points on which the well-being and the humane treatment of the patients closely depend; namely, the character, capacity, and number of the attendants, and the manner in which the hospital service is organized. A certain amount of authority must be delegated by the superintendent, but never directly to the lower grade of attendants; it should be distributed through faithful and competent heads of departments and divisions. Even in the finest hospitals, with a well-chosen corps of nurses, the service can never be of the best quality without sound organization, and without intelligent, disinterested, and high-grade oversight.

X.

MATERNITY WARDS.

Maternity cases should never be allowed in a general hospital, and the plan, wherever tried, is sure to be abandoned sooner or later, as at Bellevue, after disastrous results.

Mortality statistics.—"It is well known that it is absolutely impossible to establish a maternity ward in a general hospital without exposing the women confined in it to the greatest possible peril of life; and in every instance, I believe, in which it has been attempted in London, the mortality has been so great that it has become necessary to close the ward. The fact is certain that a woman has a better chance of recovery after delivery in the meanest, poorest hovel, than in the best-conducted general hospital, furnished with every appliance that can add to her comfort, and with the best skill that a metropolis can afford. The statistics of Lefort on the rate of mortality following the delivery of nearly two million women in different parts of Europe—one half in their own homes, and the others in lying-in hospitals—are so distinct and definite in their results as to leave no doubt."[1] The figures are these:

[1] Erichsen; Lectures on Hospitalism, London, 1874. Visitors should also consult Miss Nightingale's Notes on Lying-in Institutions, London, 1871; and Traité de l'art des accouchements (Hygiène des Maternités), par S. Tarnier, chirurgien en chef de la Maternité, et G. Chantreuil, ancien chef de clinique d'accouchements, Paris, 1882.

DELIVERIES.	DEATHS.
At Home. . . .934,781.	4,015, or 1 in 212.
In Hospital. .888,312.	30,594, or 1 in 32.

In considering the great body of facts which the history of both hospital and private obstetrical practice furnishes, the late Dr. Joseph M. Smith wrote: "There are two things which cannot fail to be suggested, and to make durable impressions on the mind. The first is the importance of preserving in absolute purity the persons, clothing, and bedding of the inmates, and also the floors, furniture, and atmosphere of lying-in hospitals; and in case puerperal fever manifests itself, of adopting the most prompt and efficient means of extinguishing it—such as ablution, ventilation, fumigation, and, if necessary, dispersion of the patients. The second is the imperative duty of physicians ever to bear in mind the danger of their becoming agents of disseminating the disease in epidemic puerperal-fever seasons, and to observe every precaution against such accidents. If, indeed, there be any moral obligation resting on a medical man to his patients paramount to every other, it is that of refraining from attending a woman in labor, if there be the slightest chance of his conveying to her the germ of a mortal disease."

The chief points above indicated, and which we must regard in the construction and management of maternity wards, are the prevention of all inside local causes likely to create puerperal fever, and the exclusion of all outside causes. To this end it is one of the fundamental principles that there should be a double set of rooms, every alternate room being

always unoccupied. There should be complete isolation of the buildings; each patient so far as possible, occupying a separate cottage, or room, with impermeable walls and not connected except by open corridor with any other apartment; and such internal watchfulness should be maintained that the chance of local production of the disease will be reduced to the smallest possible ratio. Iron bedsteads should be used, and only straw beds allowed. An under sheet of some *cheap* waterproof material, such as coarse oiled muslin, is safer than a rubber sheet, because it is more likely to be burned, and the risk of infection to the next patient is avoided. Tarnier suggests *papier goudronné* (tarred paper); several thicknesses of newspaper, or a sheet of manilla paper, laid in the folds of a draw-sheet may answer the same purpose. Bed-sheets and blankets should be freshly sprayed with disinfectants. No sponges must be allowed; wads of carded cotton can take their place, and are burned after one using; every catheter and utensil should be kept fastidiously clean, and every person who enters the room scrutinized. The system of ventilation should be as perfect as nature and science can make it, and the temperature of the ward should never be above 68° Fahrenheit. After recovery, or at the end of the puerperal state, the patient may be moved to the common waiting-ward, the bed destroyed, and the room cleansed and disinfected for the next case. Blankets should be baked after one patient's using, and all the bed- and body-clothing boiled with sulphate of zinc, as described in Chapter VI.

Suspected fever cases should be immediately isolated, and all rooms should be periodically emptied and fumigated. There should be enough nurses and helpers to prevent communication between suspected, or infected and non-infected patients. "Strong discipline should be held in a maternity hospital over the physicians themselves, both resident and attending, as well as over nurses, in the matters of rigid cleanliness and of non-intercourse."[1]

The Tarnier pavilion, built on the above general plan on the grounds of the Maternity hospital at Paris, and managed with the utmost care as to cleanliness, ventilation, and isolation, has given remarkable results. The mortality which was five in a hundred in the old hospital, has been reduced in the detached ward to less than six in a thousand. This is a two-story ward, with eight single bedrooms, four on each floor, all corner rooms. The offices and staircases are in the centre, but divided from the bedrooms by solid walls, only a fixed single pane of glass set in the office wall permitting the attendants to overlook what goes on in each room. The rooms do not communicate in any way with the lobby or office, or with each other. Rooms and offices all open on an open corridor or balcony running along each front. The corridor is roofed with glass, and this roof is detached from the main wall, so that the air vivified by the sun's rays, circulates perfectly. The bedroom walls and ceilings are hard-finished in stucco, and painted in oil colors, all corners and

[1] Dr. S. H. Chapman.

angles being rounded. The floors are of large slabs of slate or tile and have a slight incline, and the rooms are cleaned out by copious use of water. There is a fireplace in every room, the furniture, consisting only of bedstead, chair, table and crib, is of iron; a bell-cord rings a bell in the office, and the lighting at night is by gas, the burner being outside the room and shining through a pane of glass.[1]

The State Charities Aid Association has hitherto recommended (in its report for 1875) that for obstetrical cases a sufficient number of one-story pavilion wards should be provided, to be used alternately, and containing never more than six rooms, with one patient in each. This is in view of a large hospital, and a large number of births annually. But poorhouse authorities and the managers of small hospitals where lying-in cases are infrequent, should provide one or two cottages for this special use, distinct from the main house or hospital wards. The cottages can be built on the same plan as the isolating hut described in the appendix, except that, to contain two beds for women and a third for a nurse, they should be twenty-five feet square instead of twenty feet. In calculating air-space and the number of attendants needed, it must be remembered that in a maternity ward one mother implies two patients.

[1] See Traité de l' art des accouchements; Tarnier et Chantreuil, Paris, 1882, p. 801. Also, Hospitals; their Management and Construction (Lying-in Hospitals): Dr. W. G. Wylie, New York, 1877, pp. 139 and 172.

XI.

Village Hospitals.

In many of our villages and towns, remote from large cities, there is often among laboring persons and the decent poor a considerable amount of suffering, and possibly loss of life, for the want of intelligent, timely care and nursing. This is especially the case in factory villages where there are workshops, mills, and steam machinery, or in the neighborhood of mines and railways, where accidents are frequent. Ignorance of sanitary laws is to be expected in small isolated towns and among working people, and sickness as the result of ignorance is common. To meet this want, village hospitals have been organized in a few places. Such little institutions containing four, or six, or eight beds, or one bed for every thousand inhabitants of the district, provided chiefly with a view to accident cases, might well be multiplied.

A sunny and spacious dwelling-house could be bought or rented as a beginning, and modified to suit its purpose, though a new building, specially planned, with open grounds about it, is best. A good nurse who also understands simple housekeeping should be put in charge, and a women's committee should manage the house and provide, so far as necessary, by voluntary contributions, for

the running expenses. It would be well if this committee could represent all the various religious denominations of the place, one or more members being taken from each church, that the work might be non-sectarian, and might unite all classes in its support. Here, with the willing aid of the medical men of the village, injured persons could have prompt care, and sick cases appropriate food; neither of these being attainable so easily and systematically by the poor of a village in their scattered dwellings, even where private benevolence is ready to step in. Here would be found a shelter for the industrious unmarried mechanic or working-girl, who in time of sickness or accident is poorly off in a boarding-house, although ready to pay for relief. And here could be treated those respectable poor persons whose only other refuge in mortal sickness might be among paupers in the almshouse.

Rules of admission must be carefully drawn, and the committee should insist on taking pay from every patient who can pay even a trifle. If a cottage hospital becomes free to any large extent, because the managers shirk the duty of inquiring into the circumstances of applicants, or find it too much trouble to collect payments, or because the hospital has a considerable endowment, it will cease to be the thrifty and popular little institution it ought to remain. It will degenerate into a sort of private poorhouse, and prove an evil rather than a help to the laboring people.

The rules as to classes of cases admitted might

sometimes be less stringently interpreted than is possible and right in crowded city hospitals; the managers on occasion and with common consent making exception in favor of an incurable patient, or other special case of distress, where friends would engage to assume all expenses. On the other hand, rules as to the moral character of inmates should be strictly enforced in such small institutions, and private charity should not undertake to do what is more fitly delegated to town officers and the public workhouse.

A simple and distinctive name: House of Mercy, Sheltering Arms, St. Elizabeth's Home, or such similar title, would naturally suggest itself as appropriate for a cottage institution, and would be found to have its conveniences.

School of hygiene.—The cottages if well conducted would make useful impressions on chance visitors as well as inmates. The clean floors and spotless walls, the quiet, the order, the tidy beds, the appetizing food, the sunlight, and sweet air, would be suggestive of what might be possible at home. In the lack of competent local health officers, the cottage with its visiting doctor and managing committee might become a sort of little centre of sanitary instruction for the whole village, by means of simple lectures, or leaflets with rules about health, pure-water supply, disinfection, and other topics. Especially might this be the case in time of epidemic disease, though no infectious case should be taken into the hospital. A little library of useful reference could be kept, containing simple books

on nursing, what to do till the doctor comes, and similar subjects.

The hospital kitchen might be made useful to outsiders in furnishing sick diet, good beef tea, and delicately cooked food, in exchange for tickets bought or subscribed for through the committee, the matron receiving due notice of what will be called for. The house might also be the home and headquarters of a missionary nurse, or of one or two ready trained nurses for outside service in neighboring families of the better class, a portion of their earnings accruing to the cottage fund. Cottage hospitals afford no scope for training nurses, and this work should not be attempted; but each competent matron might well have always under her direction as her assistant one young woman whom she could teach in the course of a year or two to take entire charge.

In England there are between two and three hundred cottage hospitals in operation, a few of them in large towns, but in nearly all cases established by local, voluntary effort in small villages. Many of them have only three or four beds. Burdett's list gives the names of over a hundred with less than ten beds each. The cottage hospital movement has taken its place as one of the permanent charitable agencies of England.[1] Each bed is usually occupied in the course of a year by six cases, varying from a month to two months or more in duration. If beds are sometimes empty it is a needful relief to the house officers, and a sanitary advantage to the cottage and its inmates. The patients as a whole, it is

[1] Henry C. Burdett, Cottage Hospitals; London, 1880.

estimated, contribute twelve per cent. of the total income. Some of the larger of these English cottage hospitals have been planned and built with reference to their use, but they are generally simple and home-like buildings, such as the few established in New York and New England, where the patient is attended by the physician of his choice. The hard-worked country practitioner is a gainer by the plan. His time and labor are economized, and his case gets the benefit of the hospital resources and the kindly interest and care of all concerned. Open fires and the privacy, comfort, and friendly cheeriness of small wards for one or two beds make such little buildings attractive.

The site.—However small a hospital is it can secure for itself many of the hygienic features of larger institutions by judicious planning and by the ceaseless oversight and personal care of individual cases, which so often determine the result as to successful or unsuccessful treatment. A properly constructed building adapted to its purpose is as important for the well-being of a small hospital as of a large one ; and none of the principles enforced in the preceding chapters of this hand-book should be overlooked. The site should be airy and healthful, and chosen with the probability in view that if the town is a growing one it may become necessary to enlarge the building.

The drainage question is a serious one in all town and village institutions. The problem is the immediate and complete carrying away of the excreta and slop-water from the house. No hasty or igno-

rant work will answer here. The utmost care must be taken both to avoid doing harm to neighbors, and receiving harm from the condition of neighbors' premises and drains. If there can be sewer connection, a hopper or other approved form of closet (avoiding the pan closet) should be selected, and sinks and closets should be thoroughly trapped. If there is no sewer, the first step toward safety is to clean out and fill in with fresh earth any old vault. A privy built above ground with water-tight tubs on a level floor, can be easily kept neat and clean by the use of dry sifted earth or ashes, fine charcoal, and occasional powdered copperas or chloride of lime. The contents of the tubs must be kept daily covered with the dry earth, and thus deodorized, and must be periodically emptied and clean tubs substituted. No house slops must be emptied here or ever thrown out on the surface of the ground. No wooden trough or brick or loose-stone house drain is allowable. The drain pipe, where not of iron outside the house, must be hard, salt-glazed, heavy drain-tile. Wherever there is a good-sized grass-plot or unploughed stretch of porous ground, the chamber and laundry slops can be disposed of by sub-surface irrigation; see Chapter IV for these subjects. Dirty water of any kind is even worse in a hospital or house than dry filth. Chamber slops and wash water are innocent, if cared for within four or five hours, but if left longer than this decompose, and even sooner than this in sickness or very hot weather.

The kitchen pump and the kitchen sink stand side by side, and it is a natural and common mistake

to class them together and dig only one trench for carrying off the sink slop and bringing in the water-pipe; but this penny-wise policy should be avoided, and each set of pipes should be firmly and carefully laid in its own bed. Only rain-water filtered should ever be used in these little cottages for drinking and cooking, unless there is a town supply of undoubtedly pure water. Storage tanks for drinking-water must never be lined with lead or zinc or galvanized iron. Planished tinned copper is best, and they must be kept covered. Seven and a half gallons of water for each person, each day, is the least quantity that will answer. This does not include full baths and water-closets.

Water-closets and sinks must be cut off from the sick-wards by a passage-way with windows and swing doors, so that there may be no chance for the contamination of air, and there should be as little and as thorough plumbing work as possible. Every unnecessary foot of lead pipe in a house is an added danger to be avoided.

Cellars must be looked after.—The risk of severe and sudden illness often lurks in country cellars. Darkness in itself is one source of pollution. Have plenty of cellar windows; lay a floor with a coating of Neuchatel asphalt over concrete. Whitewash the walls frequently. Keep the drain pipe, if there is one, in full sight, hung along the wall. If a furnace is wanted, choose a good one, with a large evaporating pan for water, and provide a large tight metal shaft as air-feeder, drawing air from a little above the ground-level. Allow nowhere in the cel-

lar or outside of it any decaying or combustible rubbish. If the wards are built on purpose for hospital uses, there must be no closed cellar under them; they should stand on piers or open arches, and the cellar should be under the service building.

Space in the household department should be wisely divided for the sake of saving labor. The kitchen and pantries may be necessarily within the house, but should be kept as sweet and clean as can be. The laundry with its slops and its risks of infection *must* be in an outer shed. Stuffy closets, dark corners, crooked entries, should not exist. Everywhere there should be light and freshness, and simplicity of plan. The places where garbage and refuse-pails stand must be daily attended to, and dryness, sunlight, and ventilation secured. There should never be a closed cupboard under the kitchen sink, and garbage-cans must be of metal, and kept constantly scrubbed. Ashes must be sifted for privy use, and wood-ashes carefully saved for making soap and cleaning floors.

Packing the rooms of a house too close together impedes ventilation. Every room has six sides: its four walls, its top, and its bottom. If a sick-ward is closely surrounded with a room below and rooms above and on two sides of it, the air it draws in must be, to a considerable extent, impure; it will be air already breathed by somebody. Hence, the sick-ward should be detached on as many sides as possible, and put as far off as convenience and economy of administration admit, from the ordinary living-rooms of the household. This may be done by an airy, well-lighted corridor or passage-way.

Air and sunshine.—A sick-room should have the sun on it all day; the windows therefore should look out on the southeast and southwest. A bow window which may secure every ray of winter sun is an easy and valuable addition to any room which has the right exposure. The windows should let down easily from the top, and such openings can be protected by wire gauze fixed permanently in the top of the window-frame. Other simple ventilating devices are described in the chapter on Air-Supply. No apparatus will do so much good at so little cost as a window board; a piece of stout plank as long as the width of the window and six or eight inches broad. Raise the lower sash, insert the plank on edge, peg it at the ends to prevent rattling, and shut the sash down on it. The air enters at the point where the sashes overlap. If the window has double sashes in winter, the protection from cold is better, the air has a longer passage between the glasses, and can enter the room with the chill off, at the top instead of the middle of the window, and no board is needed. All four sashes of double windows should be movable.

In plastering a ward all the angles may be rounded with very little added expense; it helps cleanliness and the sweep of the air currents. All wood-work must be kept flat and plain, without grooves or mouldings. Care in arranging such details when a room is fitted up will lessen the accumulation of dust and the labor of removing it. The first step should be to scrape off all the old wall-paper if there is any. Whitewashed walls and ceilings are best, but new, plain paper, with a thick

coat of good varnish well dried in, and after a few months re-varnished, makes a neat, cheap and safe finish for a little cottage.

The size of a ward should allow at least one hundred square feet of floor space, and fifteen hundred cubic feet of air space for each bed in it; the allowance ought not to fall below this if possible. Small rooms require greater air-supply in proportion than large ones. In dwelling-houses altered into hospitals the ceilings would probably be low, and this fact should be considered, and extra air-inlets arranged so as to keep up the average supply of fresh air required. Every person in a room uses, and renders unfit for further use, thirty-five hundred cubic feet of fresh air per hour; and every light, certainly every gas-light, kept burning, is equal to six more people.

The heating of a small building is a simple matter. There can be no excuse for doing without the advantages of open fires. The rooms chosen for the sick must be the ones, if there are such, that have open chimneys. Air-tights for wood or base-burning coal stoves may be used in the living-rooms, though soapstone stoves, either open or closed, are greatly preferable. All stoves should have shallow evaporating pans of water standing on them, and closed stoves must have air-jackets. An air-jacket is a sheet of tin or galvanized iron bent round the stove, and securely fastened to the floor, and with a space of five or six inches between stove and jacket. A door can be cut in the jacket to correspond with the stove door, and so permit making

the fire and brushing up. A good-sized pipe, as large as space allows, is laid above or between the floorings; one mouth opens within the jacket, behind the stove, and the other end is carried through the wall out-of-doors. A wire gauze protects the mouth; and a valve in the pipe, to regulate the draught, may be worked by a handle within the room. This pipe brings in fresh air, which is warmed between the jacket and the stove and pours up into the room.

Air inlets.—If the smoke-pipe of the stove runs up in the room and enters the chimney toward the ceiling, the fresh-air tube brought in through the wall may be widened enough to make an outer casing for the smoke-pipe, instead of the stove itself having the jacket. The casing-pipe must stop before reaching the ceiling, and let the air warmed between the two pipes out into the room. A flaring edge or lip at the top of the air-pipe will help scatter the air without draught. This double-pipe arrangement is a good one, where there is an open Franklin stove with vertical stove-pipe.

Air outlets.—Devices for letting fresh air in are more easily provided than ways of getting foul air out, unless there is an open fire. The best use to make of the heat of a long stove-pipe, if the stove must be a closed one, is to let the pipe warm an extraction flue for foul air. To do this encase the smoke-pipe in the room by another pipe, two inches larger all round. The outside pipe must reach down nearly to the floor and flare open at the mouth, standing on short legs, and braced if nec-

essary by wires. The upper end should run with the smoke-pipe, out-of-doors. The inner smoke-flue warms the space about it, and thus creates a current, and the foul air near the floor is sucked in and carried off. Any brick chimney running up through a room or passage-way, without a fireplace, but warmed by an adjoining flue, or by some stove-pipe entering it high up, may be made to lend its help in aid of good ventilation, a register being inserted in the chimney near the floor to carry off foul air. In all ventilating arrangements, the openings for bringing fresh air in and letting foul air out ought to be at different levels in the room, the one high up, the other low down, and on opposite sides, if possible.

Two stories.—Where both men and women patients are lodged in a two-story cottage, the men should take the lower rooms and the women the second floor. In the case of convalescents it would be wise to have a separate hour for meals, or else serve the sexes apart. The staircase should be strong, safe, and wide, allowing a litter to pass easily and make the turns. The need of an upper piazza, well supported and well railed, for the women's use, must not be overlooked. Even a blind patient may be trusted on such a piazza for the measured walk up and down in the open air. There must be some provision made for the chance of fire. A Babcock or other fire extinguisher should be kept in a convenient place and tested now and then to see that it is in order for instant use. If this apparatus cannot be had, water-buckets should stand filled and ready.

The first case of measles, erysipelas, or other communicable disease, no matter how occasioned, will put a little hospital and its management to the test; so will the first death. The committee must think out and plan out in advance, when they first arrange the building, just what will be needed and what must be done in such emergency. An empty, tidy barn has sometimes served a good purpose, fitted up as an isolation ward for a chance infectious case occurring on the premises. A simple, outside hut, or in summer a tent, where there are grounds enough, should be provided, if possible, for this purpose. But if not, the room chosen should be an upper, attic room, remote from servants' quarters, well aired, with no connection by door, stove-hole, or air-flue with any other room. It should have an open, bricked fireplace, and a light wood fire should burn, summer or winter, whenever the room is used. No carpets, trunks, or stuffed furniture should be allowed in it. They only cause trouble and risk. If already exposed to infection such articles must be left standing, and disinfected with the room at the close of the case. More particular instructions for this are given under the head of Disinfection.

Working force.—For a little house with six or even eight beds, a matron who is also nurse, an assistant nurse who takes turns with her, one woman servant, and a man from outside once or twice a day for the rough work has been found a sufficient force. At times when most of the beds are full and there is a heavy wash and extra cleaning, a second servant would be required. But the lady managers

need to be constant and conscientious in their own attendance, purchasing the supplies, following up applications, and carrying on all the little incidental business of the house. A large share of moral enthusiasm is needed to run even a little hospital.

The matron should be a salaried officer. The plan sometimes pursued of paying the matron so much per head for board of patients may save the committee trouble, but is very undesirable, no matter how good a woman may be in charge.

The expense of fitting up and maintaining a cottage hospital will vary with the locality and with the ideas of the founders. At Pittsfield, Mass., a rented building with rooms for eight beds was used for three years, when a new hospital connected by corridors and intended for thirteen beds was built on the adjoining ground. This new house, including steam apparatus and the lot, cost $9,500. During the year 1882 there were sixty-six patients cared for, and the current expenses were $2,572.48. From paying patients $468 were received. This hospital is supported by current contributions mainly, from all denominations, Roman Catholics and Jews included. Women have wisely conducted its affairs from the beginning, under the gratuitous advice of a good lawyer, and resolved when planning it to aim first at two things—good plumbing and an open fireplace in every room, an example worth following. The Sheltering Arms, Norwich, Conn., furnishes an excellent model of system, economy, and success in management. In New York, the Highland Hospital at Matteawan is a

very good and useful little cottage hospital, with a partially detached ward for men's surgical cases; and other cottages elsewhere might be mentioned.

Good building plans, which with some modifications may well be adopted, will be found in Circular No. 10 of the Surgeon-General's office, U. S. A.[1] The buildings of the Nursery and Child's Hospital, Staten Island, suggest very pretty elevations.

[1] In the library of the State Charities Aid Association, with other plans and suggestions available for correspondents.

XII.

DISINFECTION.

It has been said in previous pages of this handbook that dust in a hospital is not merely dirt, it is danger. Dust in hospital wards contains organic débris of all kinds; minute particles of animal matter thrown out from the lungs or bodies of the sick. Such particles float in the air currents and lodge wherever dirt of any kind finds lodgment.

Dust and disease.—Scientific experiments made in Paris and elsewhere, have shown that the proportion of animal impurities in the dust swept up from badly cleansed hospital wards, averaged forty per cent.[1] When burned this matter gave off a fetid odor like burnt horn, and as it decomposed became very offensive. Hospital clothing, bandages, and bedding always take up and retain filth and infection from wounds and unhealthy excretions of all kinds; and so do most basins, pans, and ward utensils. Where there are cases of foul suppurative disease, still more if infectious cases are present, generating and disseminating known infectious particles, the harmful power of the impurities thrown off into the air is greatly increased. But all products of hospital foulness, even the least odorous of such products,

[1] See Parkes' Hygiene; also Fragments of Science: John Tyndall, F.R.S.

must be regarded and treated as poisons. When we are dealing with gunpowder, some one says, we do not content ourselves with keeping the majority of sparks out of the magazine; we do not let a single one enter. Disinfection means the quenching of just such sparks; as applied in hospitals it is the science of destroying all hospital poisons.

Prevention better than disinfection.—It would be well if there were in every hospital a special officer who should undertake the whole business both of ventilation and of scientific disinfection in all its details; but as this is not usual, the superintendent or matron will certainly be responsible for part of these duties. Disinfection is a complicated problem. It is not a magic art, performed with the aid of a small bit or a saucerful of some substance which removes all evils at once. There are many evils, in various conditions, and each must be attacked in the appropriate way. People must use their reason.[1] This or that process must be employed according as we have to do with impure air, or sewage, or other solid or liquid filth, or foul rooms and walls and floors, or clothing, or utensils which have received deposits of infected dust, or have come in contact in any way with the products of disease. But prevention is better than disinfection. If simplicity of plan throughout the building, and smoothness of forms and surfaces are studied, and thus as little chance as possible given for the accumulation of harmful matter; if a part of the inevitable dirt is swept out by the air currents, and another portion is dislodged and taken away by the most fastidious

[1] Robert Angus Smith, F.R.S.

cleanliness, there will be fewer occasions for resorting to chemical disinfection in hospitals.

Simplicity in details.—Every item in the construction of a hospital, whether in the building or in its fixtures and utensils, has its significance; all the minutiæ of personal oversight, their value. The flat, plain wood-work, the hard-finished walls, the well-joined floors free from cracks and chips, the polished tiles, the glass basins, the smooth, round flues, are all of sanitary importance. So are the washable gowns of the nurses, the washable furniture, and the linen instead of worsted screen-covers, and other details; because the fewer rough and angular and fuzzy surfaces, the fewer poke-holes there are, any one of which may be a nidus for infection, the better. Where there are plumbing fixtures, it is obvious that they must be of the best pattern and kept scrupulously clean and in repair. Iron waste-pipes and traps, well ventilated and with abundant water-supply, are among the first essentials.

Whatever is clean needs no disinfection; but where filth is allowed to collect, decomposition is likely to occur; and it has been found that the older a putrefaction is, the more powerful must be the disinfecting agent applied. In some cases the particular chemical chosen becomes inappropriate under the changed conditions, and a different process must be used. New products are given off by putrifying substances which are not so easily disinfected or destroyed as the original substance, and which are sometimes very volatile and ex-

tremely poisonous. For example, in neglected drains and cesspools ferments start up which are dangerous and difficult to deal with. Epidemics will often continue while the air is reeking with disinfectants. Equal but earlier painstaking might have prevented the birth of the disease. When the task was attempted, not long ago, of freeing the old surgical wards of Bellevue Hospital from the taint of pyæmia,—wards the cracks of whose walls and floors were filled with the filth of years,—it required the services of a professor of chemistry and the use of two or three tons of chlorine gas to produce an effect of even transitory value. The inference which visitors would do well to heed, is in favor of unremitting, every-day cleanliness.

The preventive part which ventilation plays will be better understood if we remember that the buoying power of a liquid or a gas increases with its velocity in such a rapid geometric ratio, that while a water current of one foot velocity per second will float a grain of sand, a current of two feet per second will float a pebble sixty-four times as heavy. If we follow this reasoning backward, we can realize that the buoyancy of matter increases with the diminution of the size of its particles, in an equally rapid ratio. There are particles of a dangerous character yet so minute as to be invisible, or only visible as motes in a sunbeam; and so light as never to settle except in an absolutely still atmosphere. Consequently, if they do not find a lodging-place in cracks, or on moist and fuzzy surfaces, or in the throats, eyes, nostrils, and pores of patients, they

will follow the air currents wherever these currents lead; whether outward through flues or windows, upward by chimney draughts, or through doors and crevices leading to warmer rooms. Impure air left dark or motionless, especially if it is also damp or heated air, will breed impurity, as impure, stagnant water does. But air vitalized by light and motion will act upon and in a measure oxidize the harmful particles it contains, and thus tend to purify itself. This is the secret of sunshine and fresh air used as disinfectants. A gale of wind may be better than a hogshead of carbolic acid, and it is possible to imagine that a steam-engine and a ventilating fan might be used to fight an epidemic. Every part of a hospital ward at some time during the day should be flooded with sunshine; and a constant, steady, searching, and thorough out-draft from the ward, its bath-rooms, water-closets, and other offices, should be ensured.

Where there are infectious cases the out-draft should be so powerful and in such a direction that under no circumstances should air from the sick-room move toward other rooms or stories in the same building. For such cases a room should be selected with wide, open hearth and chimney-throat, and a brisk fire should be kept burning in summer as well as in winter so as to determine the direction of the out-draft. The ordinary rule must be observed of putting the beds of patients ill with communicable disease in such position, if practicable, that physicians and attendants may stand to windward. Persons who come into a ward where there are

infectious cases with their hair, beards, or cloth clothing damp with fog or rain, or who, coming from out-of-doors in very cold weather, condense on their cloth garments the warm air of the room, may offer a lodging-place to floating infectious matter and carry it about, unconsciously to themselves, wherever they go.[1] Professor Pumpelly suggests a hooded gown of smooth material to be worn in the room over the ordinary clothing of the physician; and the National Health Society of London has lately exhibited such a dress—a hooded overall or mackintosh, glazed inside and out, and exposing only the face and hands. A similar garment is in use among New York physicians.

Other preventive measures which will lessen risk and labor for all concerned are the instant isolation of suspected cases and of nurses who attend them, and the burning of foul bedding and bandages used for exceptionally hazardous cases. Do not disinfect such articles; destroy them. No ordinary process of disinfection makes it safe to use them again. They should be tightly wrapped in tarred paper, or put at once into a covered vessel containing abundant chloride of lime or a solution of chloride of zinc, an ounce of zinc to a quart of water, carried instantly outside the hospital and burned without handling, in a pit provided for such purposes. The expense to the hospital of renewing bedding and bandages must not be weighed against the costly risk of communicating disease.

The various preventive measures urged are the

[1] Professor Raphael Pumpelly.

more important because the trouble attending the effective use of disinfectants is so great there is often difficulty in getting trustworthy, pure chemicals, and the quantities required are sometimes very large. The pungent odor of some disinfectants is misleading; persons are apt to err in regard to the quantity that may be relied on, and use too little. It should be remembered that deodorizers, or substances which destroy bad smells, do not of necessity destroy the foul cause of the smell. Some disinfectants on the other hand have no odor. Some fluids will preserve articles immersed in them, but are not disinfecting agents; notably alcohol and carbolic acid, which may prevent decomposition, but have little or no effect in arresting putrefaction when it has once commenced. Disinfectants to be of practical value ought to work swiftly; the more rapidly they work the better. The inconvenience, to say the least, of having to resort to any agent or any process which requires twenty-four hours for its thorough working, is obvious. All disinfectants are themselves poisonous in large quantities, as are many medicines. It it difficult to use enough of any chemical to destroy infective matter without also risking life and injuring property.

Disinfecting agents for which no chemical can ever prove an efficient substitute are:

Draughts of air for all floating foulness;

Damp and dry rubbing for all easily detached foulness;

Soap-and-water scrubbing for all adherent foulness.[1]

[1] *Dr. E. M. Hunt.*

Experiments in Germany, recently conducted under authority of the Imperial Board of Health,[1] to determine which is the best disinfectant for practical use, result in showing that chlorine, bromine, and bichloride of mercury are the only certain disinfectants. These investigations, made by Dr. Koch, the distinguished mycologist, show that what science calls the germs or spores of micro-organisms resist the action of many agents which we have been accustomed to regard as effective. The difficulty increases with the extent to which these spores have been dessicated. Thus it appears that Koch no longer considers sulphurous acid as a good disinfectant, inasmuch as the strength and conditions essential to its useful working are too extreme; that five-per-cent. solution of sulphate of iron, and five-per-cent. solution of chloride of zinc (Burnett's fluid) are without action upon spores during an exposure of many days; that chloride of lime in five-per-cent. solution requires several days to destroy spores certainly; and permanganate of potash (Condy's fluid), in a solution of like strength, a number of hours; that carbolic acid in oil or alcohol has no value whatever as a disinfectant, and in water must be present to the amount of five per cent. and must be allowed to act for at least forty-eight hours to insure the full effect; that freshly prepared chlorine water or iodine water should remain in contact with the material to be disinfected for a length of time measured by hours rather than minutes; but that

[1] Robert Koch: Mittheilungen aus dem Kaiserlichen Gesundheitsamt. Ier Band, Berlin, 1881.

bichloride of mercury (corrosive sublimate), is the most powerful agent at our disposal for disinfecting purposes, and when present in water in proportions varying from one part in four hundred to one part in a thousand is quickly and certainly destructive to all spores.

Hospital visitors, however, should not be too hasty in adopting new theories solely because they are new. When we boast of the wonderful progress of the nineteenth century, we may temper our pride with the reflection that our National Board of Health, in its most recent researches in the science of disinfection, finds nothing better to recommend than the methods of Ulysses.[1]

> "To Euryclea then addressed the king:
> 'Bring hither fire, and hither sulphur bring';
> With fire and sulphur, cure of noxious fumes,
> He purged the walls and blood-polluted rooms."

Fumigation of wards.—Every ward in a hospital, in turn, irrespective of the character of the cases it has contained, should be, at least once a year, cleared, closed, fumigated with sulphur, and then thoroughly cleaned, whitewashed, and scoured. Empty the ward. Turn out every movable thing likely to be injured. If the iron bedsteads can be spared, let them stand with beds and bedding in the room during the fumigation. Furniture, beds, and bedding must all stay if they have been exposed to infection. If there are unpainted metal objects left

[1] Odyssey, book xxii. The instructions issued by the National and New York State Boards of Health will be found in the appendix.

in the room, coat them with grease; sulphur fumes will corrode unprotected metals. Woven-wire beds must be carried out and cleansed by strong hot soap-suds, or by playing a hose on them out-of-doors, and dried quickly in the sun. If the wards have inside shutters, let them stay. Paste over with strips of paper all crevices and keyholes. Clean out and close all registers and air-flues and paste paper over them. Stuff the chimneys. Break up roll sulphur in lumps, putting it in coal scuttles or other iron pans, and set these in the corners as well as in the middle of the room, raised on bricks. The bricks should stand in any large vessel or tub which can hold a little water, or dry sand. This is a precaution against fire.

As moisture increases the action of the fumes, the floors and walls of a ward should be thoroughly sprinkled and dashed with water. If the hospital has steam apparatus, the best way is to let steam escape into the room until the condensed moisture dampens the ceiling and trickles down the walls. A little trouble will make a temporary connection with the nearest heater or wall-coil for this purpose. When all is ready, set the sulphur on fire by hot coals, or by pouring on a little alcohol and firing it. In a large ward two or three persons must assist, in order that the igniting may be quickly done. Leave the room instantly, for the gas liberated is very irritating to the lungs. Keep the doors locked and leave the room standing closed for twenty-four hours. Then open all the windows wide to get rid of the stale fumes, opening them from the outside if

practicable; and, still keeping the doors locked, leave the room standing for twenty-four hours more. If the fire has gone out without consuming all the sulphur, relight it and close the room again. It will burn as long as there is oxygen to feed the fire.

Thorough scouring.—Now is the time for stopping cracks in the plaster, wood-work, and cement, if there are any repairs needed; after the fumigation, not before. If you stop the cracks before you fumigate you shut in what germs of disease there may be, instead of driving them out and killing them. Then scour thoroughly everywhere, with hot soapsuds made of soft soap; or else dry rub and then whitewash the ceiling as well as walls. Kalsomining the ceiling is objectionable on account of the sizing used in the mixture, and because kalsomining is more expensive than whitewashing, and, therefore, less apt to be frequently repeated. Cleansing the ceiling is a most important point. Scour the bedsteads all thoroughly with hot soapsuds and wipe them dry. Wash down also every other piece of furniture that will not be injured by washing, and set all back in their places. See that the ward is dry and that the ward thermometer marks 68° or 70°, before it is reoccupied.

This process will take certainly three days for each ward. It should be put in effect at once, in any room or ward after any accidental case of infectious disease, or of malignant fever. The virtue of sulphurous acid gas is in *arresting* putrefaction in animal matters. The fumigation with sulphur, therefore to be effective must be instantly applied, and

at frequent intervals. In the case of a compactly built hospital of several stories, it is very desirable that the surgical wards should be put through this process at least once in six months. Every ward should go through it at least once a year; every isolating room at the close of every case.

As a rule, whenever fumigation is practised, by whatever agent, the washing and dry rubbing of all exposed substances and surfaces should follow. Sulphur, it must be remembered, will bleach colored fabrics and will make the lime flake off on white-washed walls. The quantity of roll sulphur required for effectual fumigation depends on the cubic air-space of the ward. Use about two pounds for each thousand cubic feet of space.

Chlorine gas may be used for fumigation in a large hospital where wards are impregnated with pyæmia, but only in immense volumes and always under the direction of an experienced chemist familiar with its use. The method already described of closing cracks, pasting up outlets, and locking doors, and of cleansing afterward, must be followed. The process of setting free the gas creates heat, and heat helps the diffusion. Moisture also is an advantage. The same dampening of the ward with water or steam should accompany the fumigation. Large shallow troughs of sheet lead, which can be rolled up and stored for use again, should be put on the floor to hold the mixture, and on mantel-shelves and other high ledges, for chlorine gas is heavy and will descend. The chemicals required, and their proportions as used by Professor Doremus at Belle-

vue, are a sack of salt, or between two and three hundred pounds, about an equal weight of black oxide of manganese, and a carboy of sulphuric acid. Like sulphur fumes, chlorine gas will bleach colors, will corrode metals, and is unsafe to breathe.

Sulphate of zinc, or white vitriol, is the prescribed disinfectant for cleansing articles of clothing and bed-linen which have been exposed to infection and are too valuable to be destroyed, but which admit of washing. The proportions are four ounces of the sulphate and two of common salt, dissolved in each gallon of hot water. The pieces should be well covered by the fluid and boiled for about an hour. The solution does not stain. Surgeons' operating gowns or aprons, all hand-towels used by doctors, and bandages and cloths used with ordinary surgical cases, must be treated with the same disinfectant, in different parcels and separate vessels, and afterward washed with plenty of soft soap; as described in the previous chapter on the laundry service. A little borax in the rinsing water will soften the harshness left by the vitriol. The importance of grass bleaching, wind and sunshine for disinfecting and drying ordinary hospital linen must be borne in mind.

Stained clothing and towels may be bleached and cleansed by throwing them for a minute or two into boiling water in which two ounces of chloride of lime to the gallon have been dissolved. The articles should be rinsed immediately in a solution of hyposulphite of soda, which destroys the residual chlorine and leaves the articles white and free from chlorine

odor.[1] The combination is sold in the shops in solution as chlorinated soda, or Labarraque's fluid. Ordinary washing with soap and hot water should follow the bleaching at once. Corrosive sublimate or a strong solution of arsenic may be used to kill body vermin, but it is better to burn verminous clothes.

Dry heat and steaming.—There are three processes, either of which may be followed, according as the outfit of the laundry may allow, for disinfecting articles which cannot be washed, such as mattresses, pillows, outer cloth clothing, hats, dresses, and shoes. Articles of this kind which have come in contact with erysipelas or other infectious disease, if not destroyed, must be baked, steamed, or fumigated. For baking they must be put into the disinfecting chest mentioned among the laundry apparatus, and heated to 212° Fahrenheit, and kept as near that heat as possible for eight hours, and afterward sunned and aired. This degree of heat does not injure such fabrics as are commonly used for clothing. Or superheated steam charged, if desired, with chlorine may be used in the chest for steaming the articles described; or they may be left in a closed ward, or room, while the room is fumigated; mattresses and pillows in that case being ripped open, the hair and feathers emptied and spread, and pockets in garments turned inside out.

In all processes of disinfection by heat it must be borne in mind that some disease germs withstand a high degree of dry heat, their virulence having

[1] Dr. Wolcott Gibbs; Harvard University.

in some instances been found to survive a baking at over 300° Fahrenheit. It must be also understood that in boiling a large vat full of water and articles of clothing, the inside of the parcel may be below boiling-point long after the water is boiling. For this reason, but few pieces should be put in at a time, and they should be well poked about and stirred. In baking, *i. e.*, disinfecting by dry heat, mattresses and bundles of clothing, the danger is greater that the interior will remain at too low a temperature even after the outside has become very hot. Mattresses and pillows, therefore, which have been made safe to handle by the baking process, must be afterward ripped, emptied, the hair or feathers disinfected anew, and sacks washed and refilled.

Expectorations, excretions, and discharges from infectious cases must be received into vessels containing fluid disinfectant, either copperas solution or sulphate of zinc, or whatever the attending physician may order; and foul handkerchiefs and cloths, and scales shed from patients' skin, must be immediately destroyed by burning whenever practicable. Rubbing the patient with vaseline in certain cases will prevent the scattering of infectious particles. Plates, cups, glasses, spoons, and the like, used for communicable cases, must be rinsed with some safe disinfectant and washed separately. With any pestilent contagion care should be taken to keep a covered tub in the patient's room, containing a solution of sulphate of zinc, in the proportion of a quarter of a pound and two ounces of salt to a gallon of water. Bed linen, towels, clothing, and handkerchiefs

should soak in this fluid for an hour. The tub and its contents may then be carried to the laundry and a second tub substituted. Wooden tubs which can afterward be broken up and burned are best. Washing the hair of the patient with strong soap-suds and borax is a necessary precaution.

Special hospitals.— All the precautions and methods recommended in this chapter as required with chance cases of infectious disease in general hospitals are equally applicable in hospitals especially intended for infectious cases, scarlet fever, diphtheria, and the like, or in maternity wards where puerperal fever occurs.

Instrument boxes and the stock of surgical appliances should be periodically aired and cleansed. It is a bad plan to keep splints, pads, and other such articles in any dark, unventilated place. Instruments likely to be needed for an operation should be laid, just before the time, in shallow block-tin or iron pans and covered with a five-per-cent. solution of carbolic acid. After use each instrument should be handed to the nurse in attendance, who should wash it and lay it back in the solution. When an operation is over all instruments must of course be cleansed and thoroughly disinfected. Tyndall, in his experiments with vapors decomposed by light, found great difficulty in securing perfectly clean tubes. He speaks of surgical risks, and instances the case of a canula and trocar which is used for the evacuation of an abscess. It is difficult, he says, to see how the instrument can be cleansed by ordinary methods; it ought, in fact, to be made as hot as its

temper will bear. But this is not done, and inflammation in a wound sometimes sets in as the result of careless and imperfect cleansing.

Catheters, syringes, scissors, and all instruments which are in common use in a hospital ward, and under the ward nurse's care, must be kept absolutely clean. To this end they must lie, after using, in an aqueous solution of carbolic acid, following the doctor's directions as to the strength; and then must be carefully rinsed and dried; or they may be dipped for a few minutes in a solution of bichloride of mercury, rinsed, and passed and held in the flame of an alcohol lamp. Dangerous particles adhere to all such instruments and often slip under the nurse's or operator's finger-nails, and unless dislodged and destroyed, may cause blood-poisoning in the next patient treated. Dried blood may be found on the corrugated handles of instruments and about the joints of scissors which have been cleaned more than once by ordinary methods. Scissor and other joints should work on an adjustable pivot instead of screw. The parts can then be separated more readily for more perfect cleansing. Sponges in surgical cases should never be used more than once. The only way to clean a sponge is to burn it.

For hand-washing of doctors and nurses, carbolic solution of five-per-cent. strength, one part of acid to twenty of water, should be kept ready bottled in quantity. The National and New York State Boards of Health omit carbolic acid from their list of household disinfectants on the ground of its

cost and the difficulty of getting it pure, and the danger that from its strong odor it will occasion a false sense of security with those who use it. Many scientific experimenters have no faith whatever in its disinfectant properties. As yet, however, no substitute for carbolic acid for the uses above indicated has been generally adopted in hospitals by medical men. Calvert's No. 1 is the quality required, and solutions must be made with boiling water and well shaken. Koch asserts that carbolized oil has no more effect than pure olive oil.

For water-closets, sinks, and all waste-pipes there are no better constant disinfectants than thorough ventilation, and an abundant flush, *i. e.*, rush of water, together with daily scrubbing with hot water, soft soap, and a scrubbing brush of every part of the fixtures which can be reached. But the slime which coats the inside of most waste-pipes and traps is a source of danger not easily got at; and the danger is greatly increased if the water-supply is scanty, or if fixtures are not in hourly use and thus not fully and frequently rinsed. A daily pouring down through all fixtures and pipes of the strongest available fluid disinfectant must therefore be resorted to. In some cases it may be preferable to put the disinfecting substance in the tank of the water-closet, so that the bowl may be rinsed with the solution every time the closet is used.

Bichloride of mercury.—If pipes and traps are of iron, as they should be, flush them with hot suds of soft soap until the pipes become quite warm; follow this with a solution of bichloride of mercury

(corrosive sublimate). A strength of one part of the drug to four hundred parts of water, or, say, thirty-eight grains to a quart, is preferable for disinfecting vessels and pipes in cases of a choleraic or typhoid nature, where it is necessary to render the dejecta instantly and absolutely harmless. A strength of one part to one thousand parts, or say fifteen grains to a quart, will disinfect most articles well drenched with it in the course of ten minutes. In preparing the solution the drug should be first boiled in a little water and with twice its own weight of common salt. It will then dissolve very quickly, and the solution so obtained may be diluted to any required extent. Bichloride of mercury cannot be used with lead pipes, or come in contact with brass or copper without injuring the surfaces; it will not injure iron. As a small amount goes very far it is a cheap disinfectant.[1] It is a deadly poison, and its use must be guarded by all the customary precautions.

Sulphate of iron, or copperas, is a cheap agent for disinfecting closets, sinks, and drains, and if the crystals are pure the solution will not seriously attack lead pipes. It should be bought in quantity and dissolved in water in the proportion of about two pounds to the gallon. A basket holding sixty pounds of copperas can be hung in a barrel of water, a barrel being about thirty-one gallons; the copperas will dissolve slowly. From this supply, when ready, stone jugs may be filled and kept at hand in closets and sick-rooms. At least a pint of the solution should be poured down each waste-pipe or soil-

[1] Dr. Wolcott Gibbs.

pipe daily, and followed by a copious flush of clean water. Ward commodes and vessels should contain a little copperas solution, or it should be immediately poured on the dejecta. The liquid will stain and iron-rust, and must be used with care.

An ounce of sulphate of zinc, dissolved with a little salt in a quart of water, will neutralize the discharges it covers; and as this fluid does not stain it may be preferred for bed-pans and other ward utensils.

Cesspools must be kept drenched with copperas solution freely poured through the house drains. Where the volume of sewage is large, and there is an overflow pipe, the stone slab or cover of the pool should be lifted off at frequent intervals, and enough chloride of lime and copperas thrown down to alter immediately the entire contents of the pool, and so keep them harmless until they can be carted off. Otherwise part of the intended effect will be lost, for a certain proportion of any liquid disinfectant runs off by the overflow. The plan may be followed of keeping a basket of lump copperas always immersed in the fluid of a cesspool, by hanging the basket with stout rope from staples in the curb of the pool, and replenishing it from time to time. When cesspools are emptied, after all the contents have been ladled out and carried away, chloride of lime in powder must be thrown to the bottom and freely dashed against the side walls; or the walls may be washed with copperas solution by the aid of a garden syringe. Eight pounds of copperas well dissolved in four gallons of water will be required

to drench any vault or pool of the ordinary size for one family of five or six persons.

Drains and cesspools which receive laundry and kitchen slop, and the house pipes leading to them, must be treated in the same way. We cannot detect by appearance or odor or by chemical examination, any material difference between the contents of a cesspool filled with the decomposed discharges of a water-closet, and another filled with the decomposed discharges of a kitchen sink.[1] Both are sources of danger; both should be carefully watched, emptied, cleansed, and disinfected.

Chloride of lime.—The volatile character of chlorine, and its rapid action in preventing harmful emanations, makes it a useful agent. Its most convenient form for ordinary use is in chloride of lime. This is the best of all cheap disinfectants, but the odor is disagreeable to many, and the fumes are sometimes injurious. Offensive smells need not remain a moment if we have this agent at hand. It may be used as powder slightly moistened in privies, in refuse-pails, on solid or liquid impurities; or may be dissolved in water for such uses in the proportion of one ounce to one quart. It should be used when fresh, the test of strength being its continued odor, and in quantities sufficient to cover the bulk it is intended to disinfect. It injures iron pipes, and will act on lead pipes when it stands in them; if passed through drains, therefore, it must be followed at once by a free rinsing.

Quick-lime as compared with chloride of lime is a

[1] Col. George E. Waring, Jr.

weak disinfectant; it is not volatile, and cannot affect dangerous floating particles in the air, but it is cheap in most towns, and can therefore be used in large quantities. It should be stone lime, finely broken and fresh-slaked, and should be closely spread over foul heaps of decaying refuse if such are ever tolerated, or used in damp places and neglected privies very freely. Where actual washing with soap and water is difficult or impossible, owing to the character of the surface, abundant lime-washing is an excellent substitute. This will keep wholesome the corners of a house or of a cellar where light and sunshine do not reach. Calx powder, made by pounding one bushel of dry fresh charcoal and two bushels of stone lime and mixing them, is of great practical use. These substances absorb foul gases, dry up moisture, and help to retard decomposition. Quick-lime must not be used where it is likely to be washed into drain pipes, for it may harden in them and obstruct them.

Removal of sewage.—Mention has been made in the chapter on Drainage and Water Supply of the danger to be feared from leaching cesspools, neglected privies, and other sources of impurity, such as leaky drains and gas-pipes in the neighborhood of dwellings. The experiments of Max von Pettenkofer, Dr. Ogden Doremus, Professor Pumpelly, and others, show how far infection may travel, and the risk we run of poisoning both the air we breathe and the water we drink when the soil about a house is saturated with polluted moisture. Any system of storing up and retaining for any length of time, the

decomposing filth of a household, in either tight or leaching cesspools, is full of danger, which the most copious use of disinfectants will not wholly obviate. Wherever there are sewers good water-fixtures are best. Where there are no sewers, as in the case of isolated institutions, well-built privies for solid matter, the tubs being removed and emptied at short intervals, combined with sub-surface irrigation for slop-water is, with our present knowledge of the subject, the least objectionable plan we can follow.

The final disposal of sewage and its indirect purification have been effected for more than one hundred and thirty towns in England, for the cities of Berlin, Breslau, and Dantzic, and for a portion of Paris, by its frequent and systematic removal to agricultural lands for fertilizing purposes. Recent and seemingly satisfactory microscopic experiments have been made with the sewage of Paris on the fields of Gennevilliers, to note the changes which it undergoes in the soil. The increased and wonderful productiveness of the land since the plan was put in force, has induced the villagers to withdraw all opposition, and join in a treaty with the Parisians by which the delivery of sewage at Gennevilliers is to continue for twelve years.[1]

[1] Address of M. Durand-Claye, at the International Congress of Hygiene, held in Geneva, September, 1882.

XIII.

CONCLUSION.

In conclusion let us return for a moment to the object for which our hospital building, its corps of nurses, its outfit, its superintendence exist, and to which they should be so carefully adapted.

What the hospital exists for.—Let no one forget that this primary object is the curing of the sick. A hospital is not founded solely to provide a field for experiments and break in raw young medical men to practice. It is not founded and supported, or should not be, to furnish "jobs," to harbor malingerers, or to make places for professional or political "friends." The great motive, at least from the hospital visitor's point of view, is charity, but charity in a certain direction; therefore a hospital should not become a mere almshouse or asylum for incurables; necessary as such public charities are, they are apart from the purposes of a hospital. The ambition, which sometimes exists, to overcrowd, to run up the numbers, and show at the month's or year's end a long list of admissions and consequently less average expense, or less average mortality, often blinds hospital authorities to the moral as well as the sanitary evils of such a course. This is a matter which visitors have a right to look into, and they should notice whether any of the

inmates are more properly almshouse cases; or convalescents who are unwisely detained; or station-house cases, such as inebriates, making use of the institution as a temporary shelter to get over a fit of excess; or mere hospital "rounders," it may be, waiting "until after the election."

Inspectors for the State.—But in all inspection, let visitors bear in mind that hasty observation and loose generalization are worthless. Criticism of any branch of hospital organization will be valuable only so far as it is founded on actual experience and study. Intelligent visitors will endeavor to learn the best methods of caring for the sick and insane and dependent classes practised in this country and in Europe; they will inform themselves of the laws bearing upon such subjects; they will read the best books and reports, and so far as theoretic study can be of use, will educate themselves for the responsible position they have assumed. They will not confine themselves to ministrations to individual patients; for while these have their place and are pleasant and acceptable to the sick, there is a broader duty laid upon the members of this Association. They will remember that they enter institutions of public charity as inspectors for the State,[1] and they will use the opportunity which frequent visiting gives to study intelligently not only details, but systems and the faults of systems. They will perceive that they cannot immediately and single-handed redress wrongs or work reform in matters which may have been gradually going awry for

[1] See the Act printed in Appendix H.

years; but they will accurately record facts and make report thereon to the proper officer of their committee, adding such recommendations as their close observation and experience ought to suggest.

Dress parades—In most public institutions there is apt to be a certain amount of "getting ready for the committee." Managers make their visits at fixed periods, once a week or once a month. Their coming is announced, at all events known; the wards are scrubbed; the ventilating fan is set going; the water-works are "all right" for the time; attendants are at their duty; clean quilts are spread over dirty sheets; rubbish is shoved into corners; and the matron or superintendent is at the committee's elbow to divert attention from doubtful places and topics. At best it is a dress parade in which the managers are the inspecting officers. Visitors must not allow themselves to be misled by such a hasty smoothing over of things on the surface. Their visits, to be effective, besides being frequent and leisurely, should be made at irregular and *unexpected* times.

Points to observe.—Visitors should note, if possible, the original cost and current expenses of any institution, and consider in what items the money seems to be consumed; what is the quality of the supplies furnished; what is the system of purchasing, storing, and issuing supplies; how the labor of the household is organized; whether the hospital service is properly graded, and the oversight and the discipline what they should be; whether there is a continuous chain of responsibility running through

the entire establishment from the top to the bottom; whether precautions are taken to keep the sexes separate; what safeguards are employed against fire; whether the use of disinfectants is understood and systematically practised by the superintendent and matron, and the isolation of nurses as well as patients during and after infection is enforced; whether religious rites are allowed for the sick, and decent burial provided for the dead.

The superintendence.—Visitors should ascertain what salaries are paid; whether these are extravagant, or are such as the officers deserve, or are inadequate to command the best service. They should especially observe the character and tone of the superintendence, and whether the chief officer is a competent person. To keep a set of books and answer questions in the office is not the whole of management. The *spirit* in which the work is conducted is all-important. The superintendent gives tone to the institution, and the attendants will never be more faithful to the interests of the hospital or more considerate of the welfare of the patients than are their superior officers.

What makes a good hospital.—Bricks and mortar will not make a good hospital; neither will half a million of money. The factors are: clean air, clean water, plenty of clean bedding and clothing, well-cooked food, enlightened medical care, trained nursing, and a pure and cheerful moral atmosphere; above all, and including all, skilled, honest intelligent, humane superintendence. "A large hospital is a complicated organization which cannot be made

to work automatically, but of which the several parts require constant adjustment and attention to prevent the production of some of the very evils which it is designed to remedy. If constant, skilled superintendence is not made an essential and integral part, the cheaper and more easily destroyed the institution is the better." [1]

The mere statistics of the vast and shifting throngs of miserable beings who pass through our public hospitals and asylums, men, women, and little children, help us to judge how weighty are the public and humane interests involved, and how costly and often cruel and morally disastrous must be the management which in any considerable degree is ignorant, lax, or corrupt. The most recent report of the State Board of Charities, dated 1883, shows the number of poor persons supported in the seventy almshouses, poorhouses, and State hospitals during the past year, as 61,700
Of whom were insane 10,202
Those, besides, who received temporary relief 70,000
Taking New York City alone, there were in Bellevue and the island institutions on a given day: [2]
Sick and disabled 8,800
Of whom were insane 3,206

The inmates of State institutions for deaf, dumb, blind, and idiotic persons; of refuges, reformatories, incorporated orphan asylums and homes throughout

[1] Dr. J. S. Billings, U. S. A.

[2] Records of the Commissioners of Charities, March 9, 1883.

the State are not included. But there may properly be added to the above figures, the count of some of the incorporated hospitals and dispensaries. In only forty of the hospitals and thirty-three of the dispensaries which made returns to the State Board the previous year there were treated:

Charity patients	22,793
Dispensary beneficiaries . . .	239,571

Public charities a public trust.—It is our duty to learn as far as possible, whether all these inmates and applicants represent genuine cases of distress, and if so whether they receive the benefit of every alleviation known to science and humanity; whether our immense public expenditures secure in all the cases requiring it, wise, skilful, and kindly care. The money which supports town, county, and State institutions is money raised by taxation and held in stewardship, and every citizen is under obligation to inform himself whether it is spent judiciously, or in a thriftless and dishonest way. Public offices of charity are in a peculiar sense public trusts. "To fill administrative positions in public charities as they are sometimes filled, for political considerations, or for qualifications other than those of competency and character, should curse any man or body of men who by so doing jeopardize the lives of their fellows." [1]

Common-sense virtues.—Yet the best organization, the most perfect theory, the healthiest site, the most finely equipped building, the most carefully devised regulations, will be elaborate failures with-

[1] Dr. John M. Woodworth.

out good-sense and good-will and a ready co-operation among managers, officers, visitors, doctors, and nurses. The common-sense virtues are particularly needed in public hospitals, where, among the patients, there are many vicious and degraded persons and many impostors.

Machine charity.—On the other hand we must guard ourselves against the hardening influence on the sympathies and conscience of routine or merely official charity. In dealing for any length of time with great numbers of unfortunate and morally infirm people, we too often lose interest in individual cases and keen perception of individual necessities. The duty laid upon us is the saving of human beings,—making the most and best of each one of these multitudes of shipwrecked souls and bodies, for its own sake, and for our common good. In the administration of our charities we must "heal in such a way that we shall not hurt, and succor in such a way as not to degrade." While we value system and organization therefore, we should not let the method by which we work degenerate into a labor-saving mechanism of relief, perfectly adjusted in all its parts, but lacking "the spirit of the living creature within the wheels."

Brotherhood.—"There are problems enough to be solved to keep all of us, who have any leisure at all, well and wisely employed,—problems which never will be solved by mere almsgiving or institutionalism, or by any thing less than the living, loving co-operation of living hearts and hands. Into such channels of endeavor, if ours is in any sense a life of

leisure, let us resolve, in the Master's name, to turn the stream of our activities." [1] The poor have been left us in trust by the gracious Founder of our faith. Let us not be afraid of the name of fanatic or sentimentalist, or hesitate in bringing to our high calling all our best wisdom and the most refined resources of our Christian love.

[1] Rev. Henry C. Potter, D.D.: Sermons of the City.

APPENDIX.

APPENDIX.

A.

ISOLATING COTTAGE.

Intended for infectious cases developed after admission; built on the grounds of the Presbyterian Hospital, 70th St., New York, January, 1876; plan by Dr. W. Gill Wylie, State Charities Aid Association.

The cottage is raised on locust posts a foot high, the space under the cottage having been excavated and then filled with ashes and concrete. Neuchâtel asphalt is a better material, the object being to secure a perfectly smooth surface or pavement under and around the building, so as to furnish no lodgment for dampness or dust. There is but one room, twenty feet square, with gable roof. There are two beds for patients, and one for a nurse screened off by a wooden partition which includes one of the windows. The windows are five feet by three, and of good quality of glass, and the building has light and air on all four sides. The roof, walls, and floor are double, and the interspace is ventilated by means of hinged boards opening outward at the top and bottom of the outer wall. The upper floor is of Georgia pine well laid. Registers open under each bed, and from these, between the floors, run tin tubes for drawing the foul air away. These tubes unite behind the stove in one flue which encases the smoke flue. The stove is an open Franklin; the pipe being double, the inner smoke flue warms the space around it, and makes an aspirating chimney for foul air on a small scale. Fresh air descends into the room through box-shafts which reach down from the roof below the level of the eaves, and are fitted with an adjustable scatter-plate at their mouths. There are also transoms over the door and windows to assist in ventilation. The cottage was tested for the first time during a heavy snow-storm in the month of February, when the thermometer outside fell to 7°. After the first day or two, being then thoroughly warmed and dried, it was kept comfortable with a tem-

perature ranging from 65° to 75°, night and day, and although used for a bad case of exsection the air was always clean and good. The cost of the cottage without concrete pavement, and without stove and furniture, was $279.

B.

OUTFIT FOR ONE WARD OF TWENTY BEDS.

Wire-woven or iron bedsteads	20
Bedsacks for straw, if used	20
Hair mattresses, if used, weight 16 pounds	20
Pillows, hair, weight 4 pounds	20
Pillows, feather, weight 4 pounds	20
Sheets	120
Pillow-cases	120
Blankets (40 pairs)	80
Coverlets	40
Draw sheets	120
Rubber sheets	10
Rubber pillow-cases	10
Hand towels	144
Bath towels	72
Doctors' hand towels	72
Wringing towels, with sticks	6
Surgeons' sleeved aprons	6
Stout bags for patient's own brush and comb	40
Roller-towels, for pantry	12
Crash towels, do.	24
Table-cloths	6
Feeding doylies or napkins	48
Mosquito nets	6
Chairs	30
Boston rockers, leather seat-cushions	6
Rolling chairs	3
Extension chairs	2
Bedside tables, with drawer	20
Commodes	4
Bed-rests, hard wood	6
Bed-trays, do. do.	6

Ward table, large	1
Dining-room table	1
Pantry table and dresser	1
Refrigerator, small	1
Looking-glasses, good quality	4
Towel-racks	4
Foot tubs	4
Foot-warmers, block tin	6
Tin basins	6
Crockery pitchers and basins	2
Glass lotion-basins	6
Nail-brushes	6
Hair-brushes	6
Dressing-combs	12
Crockery bedpans	6
Glass urinals	12
Crockery chamber vessels, covered	6
Expectoration cups	12
Spittoons	4
Soap dishes, no covers	8
Bed screens	6
Gas-stove	1
Clock	1
Match-safes	4
Brass dressing-basins, graduated sizes	4
Spirit lamp	1
Plaster heater	1
Surgical tray or table	1
Scissors	2
Spatulas	2
Oakum basket	1
Bandage basket	1
Refuse cans, galvanized iron	4
Saucepans, graduated sizes	4
Brooms, common	2
Brooms, hair	2
Birch brooms for water-closets and sinks	4
Dust-pans	2
Dust-brushes	2
Thermometers	2

Water-cooler	1
Water-pitcher	1
Dish pans	2
Pint bowls	24
Dinner plates	24
Tea plates	24
Cups and saucers	24
Knives and forks	24
Carving knife and fork	1
Spoons, large	24
Spoons, small	24
Feeding cups	6
Tumblers	24
China mugs, half-pint	24
Casters (1 set)	1
Block-tin pitchers, 1 quart	2
China pitchers, graduated sizes	6
Sugar bowls	2
Knife tray	1
Tea tray, large	1
Tea trays, small	6
Tin teapots	2
Corkscrews	2
Salt sifters, large	2
Medicine cupboard, hanging	1

C.

HOW TO WASH WOOLLENS.

Put woollens into hot soap-suds by themselves, a few pieces at a time, and rub them only with the hand, not on a board. Never pound them in a machine: Rub no soap on them. Wash them quickly.

When they are well washed in this way, rinse them in clean hot water of the same temperature, and re-rinse in clean water of the same heat, until all the soap-suds are out of them.

Never leave them soaking, or lying damp. Squeeze or wring them immediately as dry as possible, hang them in the air awhile, and iron them before allowing them to become quite dry. They should be stretched and pulled while drying to prevent fulling. Never roll *them up damp*; never sprinkle them.

The removing of every particle of soap after washing flannels, and quick drying, are the important things to remember.

Choose a dry, clear day. Avoid a freezing day.

HOW TO MAKE SOFT SOAP.

Every few days try out the accumulation of grease, and put it in an earthen crock.

When you have twenty-five pounds put it into a barrel and add fifteen pounds of potash, with a tea-kettleful of boiling water—that is, five or six quarts of water.

Let it stand twenty-four hours, and add another tea-kettleful,—five or six quarts,—of water.

When the potash has eaten up the grease (which will be in about two days) fill up the barrel with cold water, and stir it slowly until all the lumps are dissolved.

HOW TO MAKE HARD SOAP.

Mix six pounds of washing soda, three pounds of unslaked lime, and four gallons of boiling water. Let the mixture stand until it is perfectly clear; then drain off the water and pour on to the same alkaline mixture two gallons of cold water, to stand until it clears.

Put into the warm liquid which was drained off, six pounds of clean fat. Boil until the liquid begins to harden, or about two hours, stirring most of the time. While boiling, thin with the two gallons of cold water which have become clear. Pouring this on from time to time, while the soap is boiling, prevents it from boiling over.

Try the thickness of the soap by cooling a little on a plate. Just before taking it from the fire, put in a handful of salt. Wet a tub or box, to prevent sticking, and pour in the soap. When it is solid cut it into bars and put them on a board to dry. It is better they should dry a month or more.

This quantity of fat and alkalies will make forty pounds of excellent hard soap. For double the quantity of fat, double the other ingredients.

D.

STORE-ROOM AND PANTRY REGULATIONS.

1. The house-keeper or matron must keep herself informed daily of the exact number of patients in each ward who are on house diet, and will send to each ward, three times daily, the exact rations by

weight and measure, for each patient, making no allowance for a single extra meal. She will use the same precautions in weight and measure for patients on extra diet, and for officers' and attendants' tables.

2. She will receive the diet orders from the wards at a stated hour, and issue at a set time to cooks the material in all kinds needed for the day, as per diet orders; and also for the officers' and attendants' tables. No servant shall, at any time, take her place in the store-room for this duty. All store-closets and pantries must be kept locked, and the keys held by the house-keeper, who alone should have access to them.

All orders received and all material issued must be daily entered in a store-room book, with a statement of the total number on house diet and special diet, patients, officers, and attendants, for that day.

3. Provisions and stores of all kinds must be weighed, measured, counted, and compared with the quantities ordered before they are drawn upon. No pass-book system should be allowed, but all tradesmen should be required to send with their goods a ticket, or exact statement in writing, of quantity and price. These tickets should be carefully kept on file in the store-room, and sent in at stated times to the office to check the weekly or monthly bills.

There should be no guessing or judging by the eye in measuring stores received or issuing rations. A common trick of tradesmen is to send more than is ordered as well as less. Accurate measurements and careful records will give the house-keeper a sense of security, and do much to keep down the expenses of the hospital.

4. Meat bought in bulk must be cut up and trimmed in the presence of the house-keeper, and by her orders. All scraps and bones useful for soup must be put by themselves, and boiled down as soup stock, from which soups and gravies can be made. All scraps not suitable for this, when of beef or pork fat, must be tried out for cooking uses. All mutton suet and other trimmings unfit for frying with, must be weighed and added to the soap grease. No lard should at any time be bought for kitchen purposes.

5. The house-keeper must be present in the kitchen at the hours for serving the ward meals, and must assure herself that rations are sent up in exact accordance with diet sheets, and that the food is hot and nicely served.

6. Bread will be sent up in the loaf when many rations are required, and will be cut in the ward dining-room, and handed on the platter.

Great waste of bread occurs from the habit of putting a large slice as a matter of course on every plate. No butter will be served with house diet at dinner; a well-made gravy will take its place.

7. No scrap-pails or slop-buckets will be allowed in any ward pantry. All broken food *from the plates* must be sent on platters to the kitchen, and sorted there for the soap grease or swill-pail. All undistributed food from the dish, and joints and bones from which meat has been cut, must be returned to the kitchen *on the dishes*, and served again in soups, stews, and puddings. The house-keeper will inspect all food so returned. Servants, left to themselves, toss every thing into the swill-pail. The house-keeper will prevent waste by frequent inspection of the swill-pail immediately after a meal.

8. No odds and ends of food will be allowed in the ward closets or pantries, on the chance of their being needed. All extra articles must be ordered in the regular way, and provided by the house-keeper as extra rations, and noted in the store-room book.

QUANTITIES OF COOKED FOOD, FOR ONE MEAL, FOR ONE PERSON.

Soup, gruel, milk, etc.	pt.	1
Meat, fresh or salt	oz.	6
Fish, fresh or salt	oz.	6
Vegetables	oz.	4
Pudding, porridge, etc.	oz.	6
Bread	oz.	4
Butter	oz.	1
Sugar	oz.	1
Cheese	oz.	1
Pickles	oz.	1
Stewed fruit	oz.	2
Molasses (10 persons)	pt.	1
Syrup do.	pt.	1
Vinegar do.	pt.	½

The above quantities have been found abundant, the supplies being issued for the total number, and there being always a certain number who do not take some of the articles.

E.

The following rules have been for several years in successful operation in three or four of the principal hospitals of New York

City. They should be plainly printed on cards and put up in the office, halls, and common rooms, and in the bedrooms of each class of persons concerned.

GENERAL RULES FOR ALL HOSPITAL ATTENDANTS.

1. Hospital attendants shall be employed, with the approval of the managers, in such number as the services of the hospital may require.

2. They shall be under the control of the superintendent, and of the heads of the several departments in which they may be employed.

3. As far as practicable they shall have assigned to them their regular duties, but will be expected to yield willing obedience to any reasonable requirement.

4. They shall give at least one week's notice to the superintendent of their intention to leave the service of the hospital, and may require the same notice when discharged, unless they be dismissed for gross misconduct.

5. They shall not leave the hospital without the permission of the superintendent, who shall assign them their regular hours of duty and recreation.

6. Those assigned to the wards as nurses shall attend to the general order of the ward and comfort of the patients, and behave themselves with proper respect and decorum during the visits of the medical officers of the hospital.

7. No officer, nurse, or other attendant shall receive any compensation, gift, or bequest from any patient, unless authorized to do so by the managers, through the superintendent.

8. Nurses are not allowed to visit any other ward or its offices, either on or off duty, without special permission.

HEAD NURSES.

1. Must maintain quiet and order in their wards; must accompany the house physician and visiting physician on their rounds, give entire attention to their instructions, and be ready to inform them correctly as to the condition of the patients.

2. They will be held responsible for the entire charge of their wards; for the nursing of the sick, cleanliness, warmth, ventilation, and general discipline; and for the care and safety of all public and private property. They must study the interest of the hospital in preventing waste and destruction.

3. They must see that the proper bed-card accompanies every patient, and that the card is sent to the house physician on the death or discharge of the patient.

4. They must announce death, and, if possible, the approach of death, to the house physician and the superintendent, and upon the death of a patient must have the body at once quietly removed from the ward, under the direction of the house physician, cleansed, and carefully laid out by the assistant nurses.

5. They must see that the order books are sent to the pharmacy immediately after the medical visits; that the medicines correspond with the orders; that the medicines and stimulants are correctly given; that the diet is correctly distributed; and that the specific instructions put up in ward wash-closets, linen-closets, etc., are exactly obeyed.

6. They must instruct the night nurses as to the care of the patients during the night, and require of them an exact account of the condition of the patients in the morning.

7. They must at once report to the superintendent any disobedience of orders or unnecessary noise or disorder on the part of attendants, patients, or visitors to patients.

8. When they leave their wards, for business or recreation, they must regularly assign an assistant to take charge during their absence, so that the wards may *never be without a responsible head.*

ASSISTANT NURSES—DAY.

Must aid the head nurse in any way she may require; their specific duty being to wait on and keep tidy all helpless patients, and to keep beds, bedside tables, ward furniture, and utensils of every kind in good order, and perfectly neat and clean.

ASSISTANT NURSES—NIGHT.

1. Must aid the head nurse in any way she may require.

2. Must see each and every patient in their wards at least once every half hour; must have all lights put out or turned low at or before 9 P. M.; and enforce perfect order and quiet all night in the wards, adjacent halls, and stairways, reporting to the head nurse any disobedience or disorder.

3. They must transmit to the head nurse any instructions they have received from the physician during the night, and inform him or her exactly as to the condition of the patients in the morning.

4. They must at once report to the house physician any sudden unfavorable change in the condition of a patient.

5. They must observe, with great care, the atmosphere and the temperature of the wards, especially in the *early morning hours*, and endeavor to keep the temperature uniform, and the air *perfectly pure and sweet.* This will be accounted one of the most important duties of the night nurse.

Any nurse requiring medical advice will so report to the superintendent. No nurse will be allowed to go off duty or apply for medical advice, except in cases of accident, without the knowledge and approval of the superintendent.

The hours of duty will be for

DAY NURSES	6 A.M. to 8 P.M.[1]
NIGHT NURSES . . .	8 P.M. to 6 A.M.

RULES FOR PATIENTS.

[To be printed on cards and put up in the wards, in dining-rooms and day rooms, corridors and office.]

1. Patients in this hospital are forbidden to use profane or indecent language; to express immoral or infidel sentiments; to play at any game for money; to smoke tobacco in the house; to procure for themselves or others any intoxicating liquors; or to have or circulate any book, print, pamphlet, or newspaper of a vulgar, immoral, or indecent character.

2. No patient shall go into the dead-house, engine-rooms, laundry, kitchen, theatre, pharmacy, or public offices, or into any of the officers' or attendants' rooms, except on special business, or by special permission; nor shall any patient leave his or her ward without the knowledge and consent of the head nurse.

3. No male patient shall go into the women's wards, nor any female patient into the men's wards; nor shall any patient leave the house without a pass properly signed by the house physician, and countersigned by the superintendent.

4. All patients will remain quietly in their places during the visits of the physicians.

5. Convalescent free patients are required to assist in any light work which the physicians do not disapprove.

6. Convalescents will be responsible for the neatness of their beds and bedside tables, and all patients, able to do so, will rise before breakfast, and go into the ward dining-room for their meals.

[1] *With two hours off duty during the day, in turn, besides meals.*

7. Patients are required to comply promptly and cheerfully with the requests of the nurses, and behave themselves at all times in an orderly and quiet manner.

8. Wilful disobedience of these rules will subject the offender to dismissal from the hospital. Wilful injury of the water apparatus, or of any furniture or property, will subject the offender to dismissal.

F.

LUNACY LAWS.

Summary of the provisions of the Statutes of New York State with reference to the certificate of insanity, and the methods of commitment and discharge of the insane, furnished by Stephen Smith, M.D., State Commissioner in Lunacy.

CERTIFICATES OF INSANITY.

Medical Certificates—Number and Time for Making.—The certificates of two physicians are required in all cases, and must be made out within ten days of the examination by the physicians, and the patient must be admitted within ten days of such examination, or a new certificate is required.

Qualifications.—Physician making certificates must have been in actual practice at least three years, of reputable character, graduate of some incorporated medical college, a permanent resident of the State, and all such qualifications must be certified to by a judge of a court of record. No physician can make a certificate committing a patient to an institution of which he is either the superintendent, proprietor, officer, or regular professional attendant.

Character of Certificates.—They can only be made after a personal examination of the party alleged to be insane, and must be according to forms prescribed by the State Commissions in Lunacy. The facts upon which the opinion of the medical man is based must be stated in the certificate and all duly certified under oath.

Approval of Certificates.—All certificates must be approved by a judge or a justice of a court of record of the county or district in which the alleged lunatic resides, and no person can be held in confinement for more than five days without such approval.

Proofs.—Before approving or disapproving of certificates of lunacy,

the judge or justice may institute inquiry, take testimony as to any alleged lunacy, and in his discretion call a jury in each case to determine the question of lunacy.

COMMITMENT OF THE INSANE.

Commitment.—An order, a statement recorded in the case-books of the institution, and two medical certificates are required for public patients, and a bond in place of the order for private patients.

Pauper patients are admitted on an order of the Superintendent of the Poor of the county in which the patient resides, accompanied by the two medical certificates already mentioned. State paupers are committed with certificates on an order of the Secretary of the Board of State Charities.

Indigent persons, who are in such limited circumstances that they cannot "support themselves and their families under the visitation of insanity," are committed under the order of the county judge after proof of indigence, and that the insanity is not over a year's duration, accompanied by two medical certificates.

Violent and dangerous insane, whom their friends neglect to confine, are also sent by the county judges, with two certificates. Criminal insane are committed by order of the courts.

Private patients are admitted on a bond, executed by responsible parties, for their maintenance, and accompanied by two medical certificates.

A statement and history of all public and private patients, in all institutions, must be recorded in the case-books within three days after admission.

In county and municipal institutions for pauper insane, the commitments are under special Acts, which include commitment by local commissioners of charities and corrections, police justices, and other municipal authorities, but in all cases the two medical certificates, judicially approved, are required.

DISCHARGE OF THE INSANE.

Private patients are discharged by the managers of asylums, or may be removed by the persons executing the bond upon which they are received. Those who have been committed upon a warrant of a judge as dangerous to be at large, may be discharged upon the order of a justice of the Supreme Court, or if recovered may be discharged

by the board of managers upon the superintendent's certificate of recovery. Indigent patients are discharged by the managers upon recovery, and if not recovered in two years are liable to be removed after notification to the county judge, and they may also be discharged to the county authorities or friends by the board of managers. They may also be removed by their friends, though uncured, at any time before the expiration of two years, on presentation of a certified copy of a bond with sureties, approved by the county judge of the county from which the patients were sent, the bond being filed in the county clerk's office. This bond must guarantee "the peaceable behavior, safe custody, and comfortable maintenance without further public charge" of the lunatic so removed.

The managers, on the superintendent's certificate of complete recovery, may discharge the pauper patient, and whether admitted as dangerous or not, "upon the superintendent's certificate that he or she is harmless and will probably continue so, and is not likely to be improved by further treatment in the asylum; or when the asylum is full, upon a like certificate that he or she is manifestly incurable and can probably be rendered comfortable at the poorhouse." They may discharge any such patient to their friends upon the same guaranty as to safety, maintenance, etc., as mentioned in regard to indigent patients.

Criminal Insane.—A patient of the criminally insane class can only be discharged by an order of a justice of the Supreme Court, or a Circuit Judge, if upon due investigation it shall appear safe, legal, and right to make such order.

Municipal and County Asylums.—In the counties of New York and Kings the County Commissioners of Charities having charge, discharge, but only on "the certificate in writing of the physician thereof, which certificate shall be filed and kept in said asylum, stating that such discharge is safe and proper."

No insane person can be discharged from any poorhouse or county asylum (excepting New York and Kings) except upon an order of a county judge or justice of the Supreme Court, "founded upon satisfactory evidence that it is safe, legal, and right to make such discharge." Any other person or officer making such a discharge commits a misdemeanor, and is punishable by a fine of not more than $500 or less than $100, in the discretion of the Court.

G.

INSTRUCTIONS FOR DISINFECTION.—PREPARED FOR THE NATIONAL BOARD OF HEALTH, 1879. AND ADOPTED BY THE NEW YORK STATE BOARD OF HEALTH.

Disinfection is the destruction of the poisons of infectious and contagious diseases.

Deodorizers, or substances which destroy smells, are not necessarily disinfectants, and disinfectants do not necessarily have an odor.

Disinfection cannot compensate for want of cleanliness or of ventilation.

I. DISINFECTANTS TO BE EMPLOYED.

1. Roll sulphur (brimstone) for fumigation.

2. Sulphate of iron (copperas) dissolved in water in the proportion of one and a half pounds to the gallon : for soil, sewers, etc.

3. Sulphate of zinc and common salt, dissolved together in water in the proportions of four ounces sulphate and two ounces salt to the gallon : for clothing, bed-linen, etc.

II. HOW TO USE DISINFECTANTS.

1. *In the Sick-room.*—The most available agents are fresh air and cleanliness. The clothing, towels, bed-linen, etc., should, on removal from the patient, and before they are taken from the room, be placed in a pail or tub of the zinc solution, boiling hot if possible.

All discharges should either be received in vessels containing copperas solution, or when this is impracticable, should be immediately covered with copperas solution. All vessels used about the patient should be cleansed with the same solution.

Unnecessary furniture, especially that which is stuffed, carpets and hangings, should, when possible, be removed from the room at the outset ; otherwise, they should remain for subsequent fumigation and treatment.

2. *Fumigation* with sulphur is the only practicable method for disinfecting the house. For this purpose, the rooms to be disinfected

NOTE.—Carbolic acid is not included in the above list for the following reasons : it is very difficult to determine the quality of the commercial article, and the purchaser can never be certain of securing it of proper strength ; it is expensive, when of good quality, and experience has shown that it must be employed in comparatively large quantities to be of any use ; it is liable by its strong odor to give a false sense of security.

must be vacated. Heavy clothing, blankets, bedding, and other articles which cannot be treated with zinc solution, should be opened and exposed during fumigation, as directed below. Close the rooms as tightly as possible, place the sulphur in iron pans supported upon bricks placed upon wash-tubs containing a little water, set it on fire by hot coals or with the aid of of a spoonful of alcohol, and allow the room to remain closed for twenty-four hours. For a room about ten feet square, at least two pounds of sulphur should be used; for larger rooms, proportionally increased quantities.

3. *Premises.*—Cellars, yards, stables, gutters, privies, cesspools, water-closets, drains, sewers, etc., should be frequently and liberally treated with copperas solution. The copperas solution is easily prepared by hanging a basket containing about sixty pounds of copperas in a barrel of water.

4. *Body- and Bed-clothing, etc.*—It is *best* to burn all articles which have been in contact with persons sick with contagious or infectious diseases. Articles too valuable to be destroyed should be treated as follows:

(*a.*) Cotton, linen, flannels, blankets, etc., should be treated with the boiling-hot zinc solution; introduced piece by piece, secure thorough wetting, and boil for at least half an hour.

(*b.*) Heavy woollen clothing, silks, furs, stuffed bed-covers, beds, and other articles which cannot be treated with the zinc solution, should be hung in the room during fumigation, their surfaces thoroughly exposed, and pockets turned inside out. Afterward they should be hung in the open air, beaten and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, etc., should be cut open, the contents spread out and thoroughly fumigated. Carpets are best fumigated on the floor, but should afterward be removed to the open air and thoroughly beaten.

5. *Corpses* (in case of infectious disease) should be thoroughly washed with a zinc solution of double strength; should then be wrapped in a sheet wet with the zinc solution, and buried at once.

Metallic, metal-lined, or air-tight coffins should be used when possible; certainly when the body is to be transported for any considerable distance.

George F. Barker, M.D., *University of Pennsylvania, Philadelphia.*

C. F. Chandler, M.D., *College of Physicians and Surgeons; Health Department, New York.*

Henry Draper, M.D., *University of the City of New York.*
Edward G. Janeway, M.D., *Bellevue Medical College; Health Department, New York.*
Ira Remsen, M.D., *Johns Hopkins University, Baltimore.*
S. O. Vander Poel, M.D., *Albany Medical College, Albany, N. Y.; Health Department, New York; Health Officer of the Port of New York.*

CURRENT WHOLESALE PRICES OF DISINFECTANTS, APRIL, 1883.

Sulphur roll, by 25 lbs.	5 cents per lb.
" by barrel	2⅛ " "
Black oxide of manganese, by 100 lbs.	3½ " "
Sulphuric acid, by carboy	2 " "
Sulphate of zinc, by barrel	4⅛ " "
Bichloride of mercury, by 25 lbs.	50 " "
Sulphate of iron, by barrel	1 cent per lb.
Chloride of lime	4 cents "
" " by cask	2⅛ " "
Hyposulphite of soda, by 100 lbs.	3 " "
Labarraque's solution, by dozen bottles	$2 75
Carbolic acid, Calvert's No. 1, "	1 65

H.

County and town poorhouses and city almshouses are legal terms. They signify all public charitable institutions, hospitals, or otherwise, which may be under the charge of county superintendents of the poor, town overseers, and city commissioners of charity.

LAWS OF NEW YORK, CHAPTER 323.

AN ACT to confer upon the State Charities Aid Association the power to visit, inspect, and examine any of the county poorhouses, and town poorhouses, and city almshouses within the State.

PASSED May 20, 1881; three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. Any Justice of the Supreme Court of the judicial district, within whose boundaries any of the public charitable institutions

of the State hereinafter referred to is located, is herein authorized to grant, on written application of the board of managers of the State Charities Aid Association (a corporation organized under chapter three hundred and nineteen of the laws of eighteen hundred and forty-eight, and amendatory acts), through its president or other designated officer, to such persons as may be named in said application, orders for the purpose of enabling them or any of them to visit, inspect, and examine, in behalf of said association, in the county in which the visitor so appointed shall reside, any of the county poorhouses and town poorhouses and city almshouses within the State, and located within such judicial district. Each of such orders shall specify the institution or institutions to be visited, inspected, and examined, and the names of the persons by whom the visitation, inspection, and examination are to be made, and shall be in force for one year from the date on which it shall have been granted, unless sooner revoked.

SEC. 2. It shall be the duty of any and all persons in charge of each and every poorhouse or almshouse embraced in the order specified in the first section of this Act, to admit any or all of the persons named in the said order of the Justice of the Supreme Court into every part of such institution, and to render the said persons so named in said order every facility within their power to enable them to make in a thorough manner their visit, inspection, and examination, which are hereby declared to be for a public purpose, and to be made with a view to public benefit. Obedience to the order herein authorized shall be enforced in the same manner and with like effect as obedience is enforced to an order or mandate made by a court of record.

SEC. 3. It shall be the duty of the said corporation to make an annual report to the State Board of Charities.

SEC. 4. This Act shall take effect immediately.

STATE OF NEW YORK,
Office of the Secretary of State, } *ss.:*

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom and of the whole of said original law.

JOSEPH B. CARR,
Secretary of State.

I.

BOOKS OF REFERENCE.

The following books and reports have been consulted in preparing this Hand-book. Most of them are simple, practical treatises, and visitors would do well to look them up, either in some public library, or by applying to the librarian of the State Charities Aid Association, 6 East 14th Street, New York :

Notes on Hospitals ; Florence Nightingale, London.

La Salubrité des Hôpitaux ; Michel Levy, Paris.

Étude sur les Hôpitaux ; A. Husson, Paris.

Das Baracken Lazareth der Königlichen Charité ; Esse, Berlin.

Das Augusta Hospital ; Esse, Berlin.

Verbandplatz und Feld-lazareth ; F. Esmarch, Berlin.

Lazareth und Baracken ; R. Virchow, Berlin.

Kriegslazarethe von Berlin, nebst einem Vorschlage zur Reform des Hospitalwesens ; Steinberg, Berlin.

Hospitäler ; F. Oppert, (3 ed.,) Hamburg.

Circulars Nos. 4 and 10 ; Surgeon-General's Office, U. S. A.

Marine Hospital Service ; U. S. annual reports.

Hospital Construction and Organization ; Johns Hopkins Hospital, Baltimore ; Dr. Stephen Smith and others, New York.

Hospitals : History, Organization, Management, and Construction ; Dr. W. Gill Wylie, New York.

Construction of Hospitals ; Douglas Galton, London.

Cottage Hospitals ; H. C. Burdett, London.

Sanitary Arrangements for Dwellings ; W. Eassie, London.

Filth Diseases and their Prevention ; John Simon, Medical Officer to the Privy Council of Great Britain. (American ed.)

Dangers of Impure Ice ; Professor Raphael Pumpelly, New York.

Sanitary Engineering ; B. Latham, London.

Water and Water Supply ; W. H. Corfield, London.

Sanitary Drainage of Houses and Towns ; G. E. Waring, Jr., Boston.

House Drainage and Sanitary Plumbing ; W. P. Gerhard, New York.

National Board of Health ; Bulletins with Supplements ; Washington, D. C.

State Boards of Health, New York, New Jersey, Connecticut, and Massachusetts ; annual reports.

American Public Health Association; reports and papers.

Manual of Practical Hygiene; E. Parkes, London.

The Air in Relation to Clothing, Dwelling, and Soil; Max von Pettenkofer, London.

Hospitalism and the Causes of Death after Operations; J. E. Erichsen, London.

Fragments of Science (Dust and Disease); John Tyndall, F. R. S.

Deaconesses; or, The Official Help of Women in Charitable Institutions: Rev. J. S. Howson, D.D., London.

Notes on Surgical Nursing; Barnes, London.

Notes on Lying-in Institutions; Florence Nightingale, London.

Traité de l' Art des Accouchements (Hygiène des Maternités); S. Tarnier et G. Chantreuil, Paris.

Care and Cure of the Insane; Mortimer Granville, M.D., London.

Private Care of the Insane; R. L. Parsons, M.D., New York.

Practicability and Value of Non-Restraint in Treating the Insane; J. C. Shaw, M.D., New York.

Care of the Insane; Dr. Bucknill, London.

Chapters in the History of the Insane in the British Isles; D. H. Tuke, M.D., London.

Reports of Board of Commissioners in Lunacy; Great Britain.

National Association for the Protection of the Insane; reports and proceedings, New York.

Epidemics from a Chemical Stand-point; R. Ogden Doremus, M.D.

Disinfectants and Disinfection; Robert Angus Smith, F.R.S., Edinburgh.

Mittheilungen aus dem Kaiserlichen Gesundheitsamt; Ier Band, Berlin.

Über die Milzbrandimpfung; Robert Koch, Kassel.

State Boards of Charities, New York, Pennsylvania, Wisconsin, Province of Ontario, and others; annual reports.

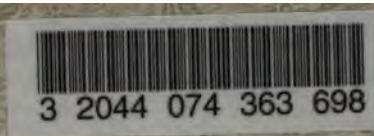
National Conference of Charities; annual reports and proceedings.

Journal of Social Science.

Sanitary Engineer.

American Architect.

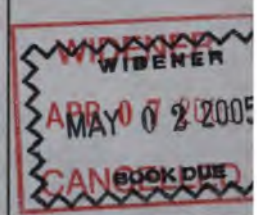
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